

## *List*

1 .Overview.....	- 3 -
1.1 System appearance and panel.....	- 3 -
1.2 The main interface.....	- 4 -
1.3 System Style.....	- 8 -
1.4 Version.....	- 10 -
2.Product creation and editing.....	- 11 -
2.1Data products.....	- 11 -
2.2 Graphical products.....	- 21 -
2.3 Big arc bending.....	- 31 -
3.Run the product.....	- 36 -
3.1 Data products.....	- 36 -
3.2 Graphical products.....	- 37 -
4.Die set.....	- 39 -
4.1 Upper mold setting.....	- 39 -
4.2 Lower mold setting.....	- 40 -
5.Machine set up.....	- 41 -
5.1 Set inherent parameters of machine tool.....	- 41 -
5.2 Block setting.....	- 41 -
6.debugging.....	- 43 -
6.1 Debugging parameters.....	- 43 -
6.2 Input and output state.....	- 46 -
6.3 Manual adjustment shaft.....	- 47 -
6.4 the curve.....	- 48 -
6.5 combination lock.....	- 50 -
7.Constant set.....	- 51 -
7.1 Material set.....	- 51 -

7.2 General parameter setting.....	- 53 -
7.3 Default parameter Settings.....	- 56 -
8.System Settings.....	- 58 -
8.1 Time setting.....	- 58 -
8.2 Language Settings.....	- 59 -
8.3 Password change.....	- 60 -
8.4 Network Settings.....	- 61 -
8.5 Backup recovery.....	- 62 -
8.6 Display Settings.....	- 65 -
8.7 Version.....	- 66 -

# 1 .Overview

## 1.1 System appearance and panel

The appearance of CNC system of MT15 bending machine is as follows:



1.1-1 MT15 system appearance

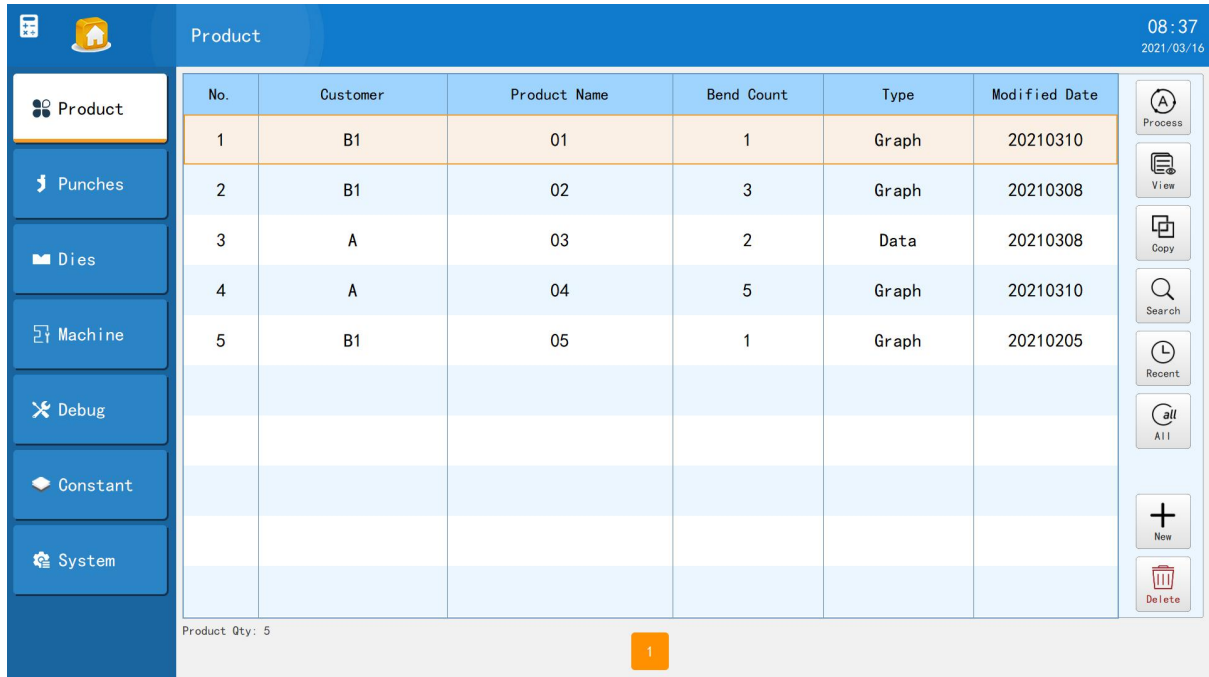
The system adopts a 15.6 "TFT true color LCD screen with a resolution of 1920\*1080px and a high sensitivity resistive touch screen. It can be operated by wearing gloves or connecting the mouse.

Under the system screen, hand/automatic, oil pump and emergency stop buttons are respectively installed from left to right.

There are two USB interfaces at the bottom of the system to connect external drivers, such as U disk, keyboard and mouse.

## 1.2 The main interface

After the system is started, the main interface will be displayed, as shown in the figure below.



1.2-1Main System Interface

The main interface structure is as follows:

**The title bar:** Display the current page name, runtime display product related information, the right side of the current time and date.






**The navigation bar:**





Calculator: after clicking the system will provide calculation function, convenient to calculate data at any time;


Menu key: when the navigation bar is hidden, click the menu key to expand the navigation bar.


 Product | Click back to the main interface of the system, display the list of products, you can add/edit/run/delete products.

 Punches  
 Dies | Click to enter the upper/lower mold library interface, you can browse and edit the mold.

 Machine | Include machine tool related parameter setting, such as machine tool shape, finger block, etc.

 Debug | Click Debugging to run the manual bending function. Manual bending does not depend on specific products, but directly input the bending parameters to control the operation of the machine tool, not only can be used for machine debugging, but also can be used for the rapid operation of single-channel bending.

 Constant | Include common system parameters and material Settings, etc.

 System | It provides system time setting, language setting, password modification, network setting, display setting, backup recovery and log export functions, and can also view the current software version.

**Information bar:** All products are presented in a list containing the customer name, product name, number of bends, product type, and modification date of the product. When the number of products is large, the page can be turned quickly through the bottom page number button.

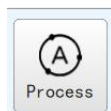
No.	Customer	Product Name	Bend Count	Type	Modified Date
1	B1	01	1	Graph	20210310
2	B1	02	3	Graph	20210308
3	A	03	2	Data	20210308
4	A	04	5	Graph	20210310
5	B1	05	1	Graph	20210205

Product Qty: 5

1

### 1.2-2 Product list

**Command bar:** You can execute commands for products in the information bar, such as Process, View, Copy, Find, New, and Delete, or you can use the Last or All commands to reorder the products.



You can execute commands for products in the information bar, such as Process, View, Copy, Find, New, and Delete, or you can use the Last or All commands to reorder the products.



If you want to view the details of a product, or modify the parameters of the product, you can select the product first, and then click "View" to open the product information interface. The system provides a shortcut operation mode, double-click product can also achieve this function.



Product replication is provided. With the same product features, you can quickly generate a new product with the same product parameters except the product name.



If the operation of the product is not on the current page, and you know the characteristics of the product, you can click the "Find" function, enter the relevant information of the product, such as customer name, product name, type (data/graphics/all), you can also delimit the modification date range of the product. The system supports fuzzy lookup. If you type "AB", you can find all products that contain "AB" and "AB" characters, such as "DAB", "ABE", "ABC", or "Cab".

Find products

Customer	
Product Name	
Type	All types ▼
start date	
Deadline	

Confirm
 Cancel

### 1.2-3 Product screening



Click Recently, the list of products will be reordered by the last modified date; Click All and the list of products will be sorted by product name.



Click "New" and select the product type "Data" and "Graphics" to be created. You can enter the navigation process of product creation. You can operate step by step according to the prompts of the system to complete the addition of the product.



If the product is no longer valid, then you can select the product and click "Delete" to clear the specified product and free up space.

### 1.3 System Style

The system has been carefully designed, beautiful interface, easy to operate.

As the main interface, all the system interface style is unified, the top is the name of the window function, the left is the shortcut navigation key, the center is the information display area, the right is the function key of the current window, simple and easy to use.

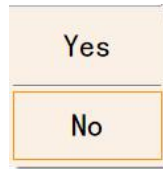
The field format is uniform, the field name is centered, and the value of the field is on the right, as shown in Figure 1.3-1.



1.3-1 Field format


If a certain field can be input, then directly through the touch screen click on the field, you can pop up the corresponding input interface. The input mode of the field generally includes the following modes:


Type field, which provides a drop-down box for selecting a method, as shown in the image below.



1.3-2 Type selection

Name field, the system provides an alphabetic and numeric input interface, the system allows the use of a combination of letters & numbers as the name. Input

completed, if confirmed, then click the lower right corner  to save the input

content; If you click on the top right corner , the system discards the information you just entered. As shown in Figure 1.3-3.



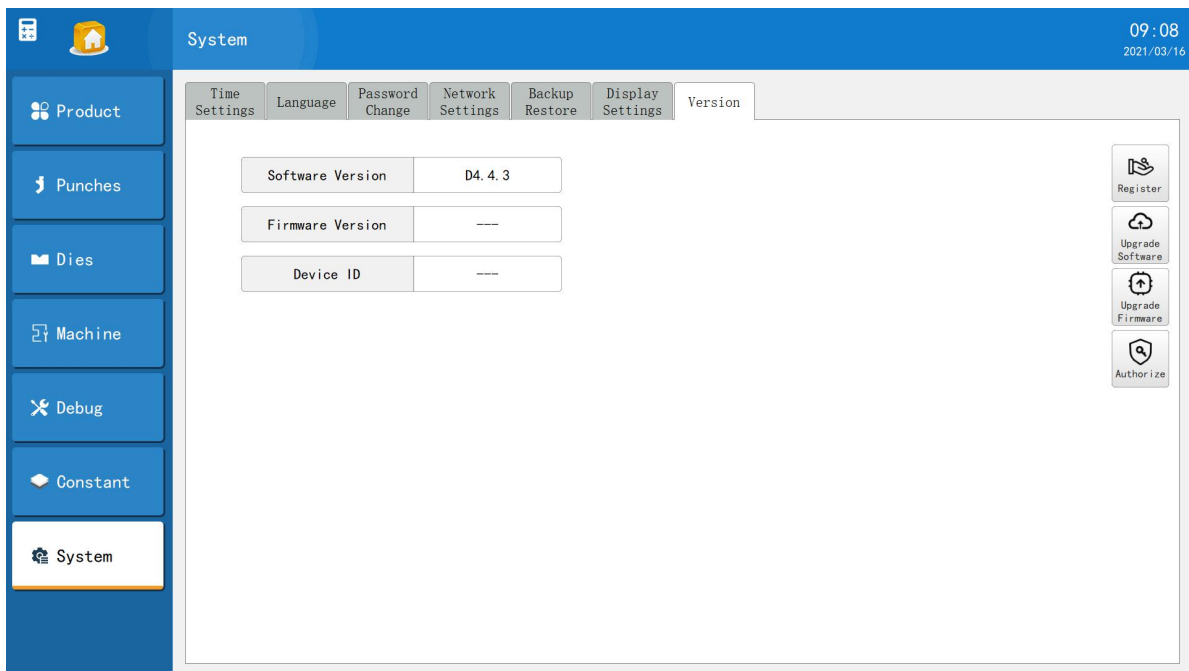
1.3-3 Field input

A numeric field, which operates like a name field, but only numbers are allowed.



1.3-4 The numerical input

## 1.4 Version



1.4-1 Software version

In the main interface, click System Settings to select the version, you can browse the version information of the system, and you can also authorize the software. As shown in Figure 1.4-1. The product will be updated from time to time to add new functions or optimize the current functions, and the version number of the product

will be changed accordingly. Please pay attention to our release information and keep abreast of the latest developments of the product.

## 2.Product creation and editing

By input the bending parameters of the product in the form of data, the user needs to be familiar with each detail of the product, which can solve the more complex product design.

### 2.1Data products

The programming of data products adopts the list mode to be input by the user item by item. The detailed process includes: the input of general information of products, the setting of single-channel bending parameters and the correction of auxiliary parameters.

Click "New" in the right function key, select "Data Product", and open the general information entry window, as shown in Figure 2.1-1 and 2.1-2.



2.1-1 Create a new product type selection

### 2.1-2 Data product general information entry

-Customer: Describe the name of the subordinate customer of the product, up to 20 characters. The customer name can contain letters and numbers.

-Product name: combination of letters and numbers. A keyword with a product name that uniquely identifies the product and cannot be repeated. The maximum length is 20 characters.

Data programming products can choose between "Angle" and "Location" programming modes:

-Angle mode: the bending angle is used to determine the final bending position, and the corresponding Y axis position is automatically calculated by the system.

-Position mode: use the coordinate position of Y axis to determine the final bending position; The Y-axis position is entered directly by manual input.

-Thickness: Thickness of the sheet to be machined.

-Materials: Materials in the system are presented in the form of drop-box, which can be selected by the user. For the editing and deletion of

materials, please refer to the instructions in the relevant section of material setting.

After the entry of common attributes is completed, click OK to enter the interface of bending list of data products, as shown in Figure 2.1-3.

No.	Punch	Die	Method	Length	Angle	Open	X-Axis	Back	Wait	R-Axis	DF
1			AirBend	100.00	90.00	40.00	0.00	0.00	No	0.00	0

2.1-3 Bending list of data products

In order to facilitate user operation, we have carried out in-depth optimization of the programming mode of data products, realizing the integration of editing and running, that is, after the user completes the setting of the product, click the Run button in the lower right, and the system can execute the running command in the original page, eliminating the cumbersome page jump.

Above the editing interface are the menu key, the name of the current interface, the information of the current product part (in the schematic diagram, they are: Angle mode, current process/general process, state, current cycle number/total cycle number, user name/product name, Y1 value /Y2 value), time and date.

-Bending process: 1/1, means the product has a total of 1 bend, the current work step number is 1.

-Status: After connecting the machine tool, the running information of the slider is displayed.

-Number of cycles: shows the repeated execution of the current bend of the product. If 0, it means that the current bend is skipped.

-Y1、Y2: Display the Y axis value of the bending machine.

The left side of the interface is the operation information and the basic parameters of the product. When running, the running information box displays the real-time data of each axis. The parameters in the basic parameters box can be modified by clicking.

-Number of products: click "Number of products" to modify the total number of products to be processed, such as 10.

-Single-step mode: Once the single-step mode is opened, the system will automatically stop each bend after running. Click the "Run" button to bend again, but it will not automatically change the step, so you need to manually switch the next bend. Single-step mode is off by default. After

running, the system will continue to process until all products are processed.

-Connect the product: the current product processing after the completion of the shutdown, continue to process the next product.

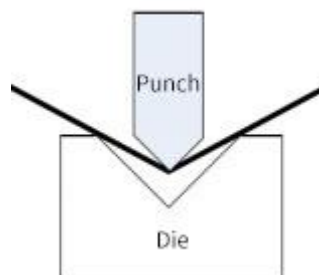
In the center of the interface is the bending parameter list of the product, one line corresponds to one bend. Users can move the table left and right to edit it, including modification of auxiliary parameters.

No.	Punch	Die	Method	Length	Angle	Open	X-Axis	Back	Wait	R-Axis	DF
1			AirBend	100.00	90.00	40.00	0.00	0.00	No	0.00	0

#### 2.1-4 The main parameters

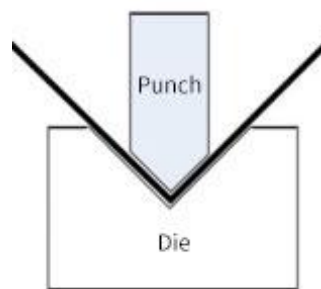
Bending type selection::

-Free bending: bending the sheet material to the set Angle by falling the upper die to the desired depth, as shown in figure 2.1-3. The system calculates the required Y-axis position to obtain the set Angle. Free bending requires that the Angle of the upper die is less than or equal to the Angle of the lower die, and the target Angle is larger than the Angle of the upper die and the lower die.



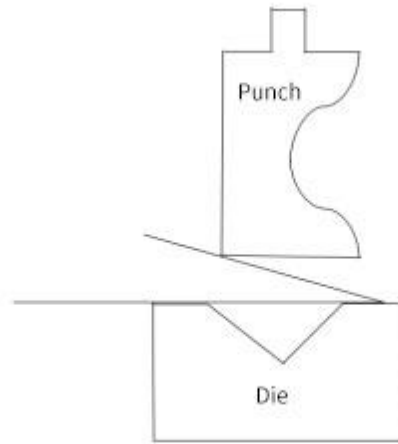
2.1-5 Free bending

-Bottom pressing bending: the sheet material is precisely pressed and folded between the upper and lower dies, and the bottom of the lower die is the required Y axis position (considering the thickness of the lower plate), as shown in Fig. 2.1-6. The Angle of the upper die, the Angle of the lower die and the Angle of the target are equal. The Y-axis position can be corrected at run time by correcting the value.



2.1-6 Sole press bending

-Flat bending: Fold the sheet in half. After the previous bend, the sheet is folded in half at a sharp Angle, as shown in figure 2.1-7. The system calculates the exact position of the Y axis to perform this action: the sum of the lower die surface and the plate thickness twice. The Y-axis position can be corrected at run time by correcting the value.



### 2.1-7 Flatten bending

-Width: The width of the sheet material along the length of the die.

-Angle: Angle of bending. The Angle parameter is displayed when the mode is Angle mode and free bending mode.

-Opening height: clearance opening between upper and lower dies after bending.

-X axis target value: the horizontal movement position of the rear stopper.

-Recede distance: the retreat distance of the back stopper during bending. The retreat of the back stopper begins at the clamping point of the sheet.

-Wait back: in case of concede, it is necessary to choose whether to make Y axis wait until the concede operation is completed. No: When making a concession, the Y axis will not wait for the concession to be in place

and will descend directly; Yes: In the concession, the Y axis waits for the concession to be in place before the slider comes down.

-R-axis target value: the vertical movement position of the rear stopper.

-Deflection: the amount of movement generated by an upward force applied to the worktable by a hydraulic compensation cylinder or a mechanical compensation method during the processing of products. Make the processing width of the product, the bending of the target Angle to maintain the same.

No.	Change Type	Delay time	Dwell Time	Feeding Speed	Decomp Speed	Decompression	Repetition	Parallelism
1	1	0.1	0.1	10.0	10.0	2.50	1	0.00

### 2.1-8 Auxiliary parameters

-Speed conversion point: the conversion point from the fast lower speed of the slider to the work feed speed. The parameter set here is the distance of the speed conversion point above the sheet material. The value of the speed conversion point of the lower die is used by default.

-Pressure: the maximum tonnage that can be adjusted when pressing (automatically calculated by the system).

-Step change mode: step change mode: used to decide when the next bend is effective after the end of bending, that is, when the step change.

Possible values are:

1 = Change step when the slider reaches the upper dead center;

2 = Change step when the slider reaches the upper dead point and the external signal is valid.

-Shift Delay: Delay time before shift.

-Holding time: pause time of upper die at bending point.

-Work speed: Specifies the speed of the slider during work.

-Unloading speed: prescribes the speed of the slider in the unloading stroke.

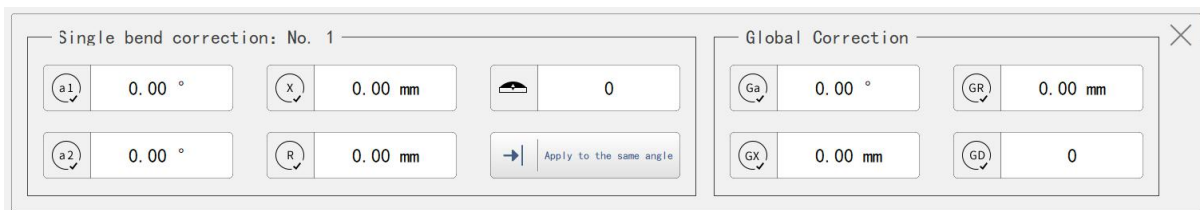
-Unloading distance: the unloading distance after bending, used to release the working pressure.

-Number of cycles: The number of times that the procedure should be repeated, in the range of 0-99, with 0 indicating that the procedure is skipped.

-Parallelism: The difference between the left and right cylinders (Y1, Y2). A positive parameter means that the right oil cylinder is lower than the left, and a negative parameter means that the right oil cylinder is higher than the left. The set value is valid within the limit of the maximum parallelism of the internal parameter.

-Block finger: the position selection of the block finger is set in the machine tool setting - block material. Users can set the information of the block finger by themselves, such as the optional block index, etc., please refer to the instructions in the relevant chapters of the machine tool block finger setting.

On the right side of the interface is the function key, the user can execute the commands of add, insert, swap and delete, or set the current bend as large circular arc bending (see the relevant instructions in Section 2.3 large circular arc bending). Click the upper turn and the lower turn to switch the selected turn. Click Calibration to view or modify the correction value for the current turn, or to set the global correction value for all corners. Calibration parameters will take effect immediately after modification.



### 2.1-9 Correction of the content

After the basic parameters and auxiliary parameters are set, the information of the curve can be saved. When confirming and saving, the system will check the curve parameters. If the parameters are illegal, adjust them according to the prompts of the system. The curve information can only be saved if all parameters are correct. If you click "Cancel" directly, you will terminate the product creation process.

After all parameters of the data product have been entered and confirmed, click "OK" to save the product. At this point, the data product creation process is completed, and the newly added products can be seen in the product list on the main interface.

If you need to run the product directly, you can click the Run button at the bottom right of the interface.

## 2.2 Graphical products

Data products can be generated by data entry, while graphics products can be automatically generated by tapping on the touch screen to draw the side map of the product and generate the bending process, which is very simple to use. Compared with data products, graphic products are more intuitive, showing the processing details of each step in graphic mode.

The new process of graphic products adopts the navigation mode "next step" to guide the user to input item by item. The detailed process includes: input of basic information, drawing of the side diagram of the workpiece, mold distribution, process distribution and checking and summarizing. You can also use Back to view or modify previously entered information.

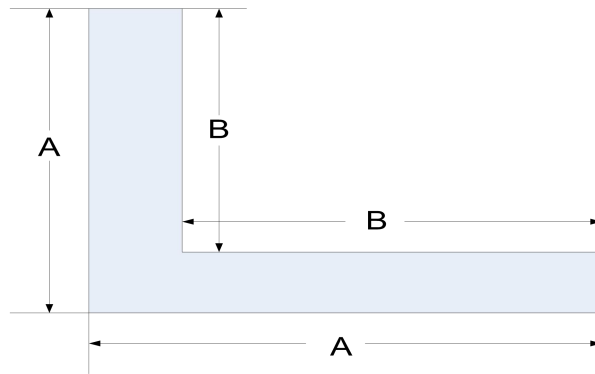
First, click "New" on the main interface, select "Graphic Product", and enter the basic setting interface of the product, as shown in Figure 2.2-1.

The screenshot shows the 'New Graph' interface with a blue header bar. The header contains a home icon, a 'New Graph' title, and the time '09:34' and date '2021/03/16'. Below the header is a navigation bar with five tabs: 'Basic Settings', 'Graph Drawing', 'Assign Dies', 'Process Settings', and 'Check Summary'. The 'Graph Drawing' tab is selected. The main content area is divided into two sections: 'Product:' and 'Product Params:'. The 'Product:' section has two input fields: 'Name' and 'Customer'. The 'Product Params:' section has four input fields: 'Thickness' (1.00 mm), 'Material' (dropdown), 'Length' (100.00 mm), and 'Size Type' (Outer dropdown). At the bottom right, there are two buttons: a right arrow and a red circular arrow.

2.2-1 Graphic product basic information Settings

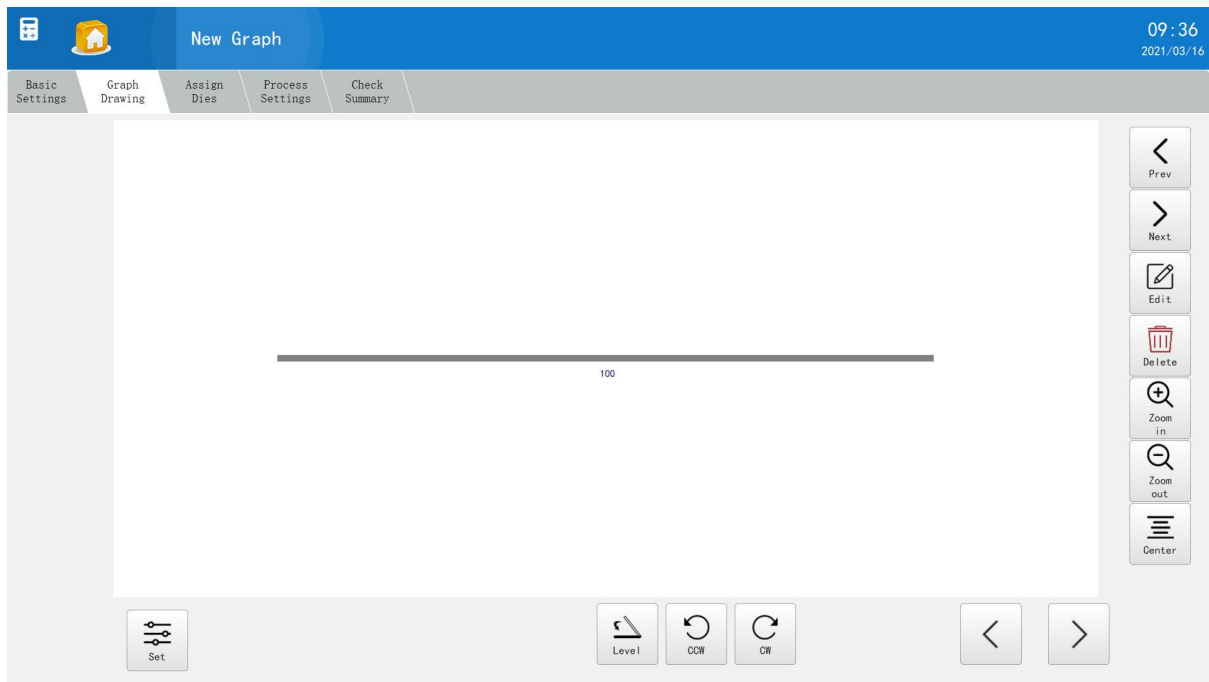
Basic product information, including customer name, product name, thickness, material, width and size type. The customer name of multiple products can be repeated, but the product name is unique and cannot be repeated. If the product name entered into the new product already exists, then the confirmation will get an error.

Size types, including external size, internal size two. As shown in Figure 2.2-2, the product consists of two edges, A representing the outer dimension and B representing the inner dimension.



2.2-2 Inner dimension and outer dimension are indicated

Once the basic information of the product has been input, click "Next" to enter the graphical interface. As shown in Figure 2.2-3.



### 2.2-3 Graphics rendering

The white window in the center of the screen is the drawing area, the right side and the lower side are the function keys, and the left side of the lower side is the setting button, which can be used to set the Angle specification and sensing range. Click directly in the drawing area to generate line segments conveniently. The included Angle between two line segments is the bending Angle. Multiple line segments and vertices constitute the side image of the product. If multiple lines drawn cross (collide), then the system will indicate that interference has occurred.

How do I change the length of an edge? There are two ways.

Method 1: Double-click an edge, the selected edge will appear in red, and the length editing window will pop up to change the length.

Method 2: Select the edge to be modified, click the Edit button on the right, and change the length.

How to modify the bending Angle? There are two ways.

Method 1: Double-click on a vertex, select the bent Angle, and the selected Angle will be displayed in red. An Angle Edit window will pop up to change the Angle and bending type.

Method 2: Select the vertex to be modified, click the edit button on the right, and change the Angle and bending type.

There are two types of bending available, free bending and large arc bending (see section 2.3 for related instructions).

2.2-4 Bend properties editing

How to remove edges and bends?

Select the first edge or the last edge, and click the function button "Delete Edge" to delete the edge and the adjacent bend corner. Note: The middle edges and angles cannot be deleted directly.

Previous/Next: When selecting an edge or corner, in addition to touching the edge or corner, you can also use the previous item and the next item.


Zoom in: you can scale up the current graph, if the local graph is more complex, you can enlarge the graph after operation.

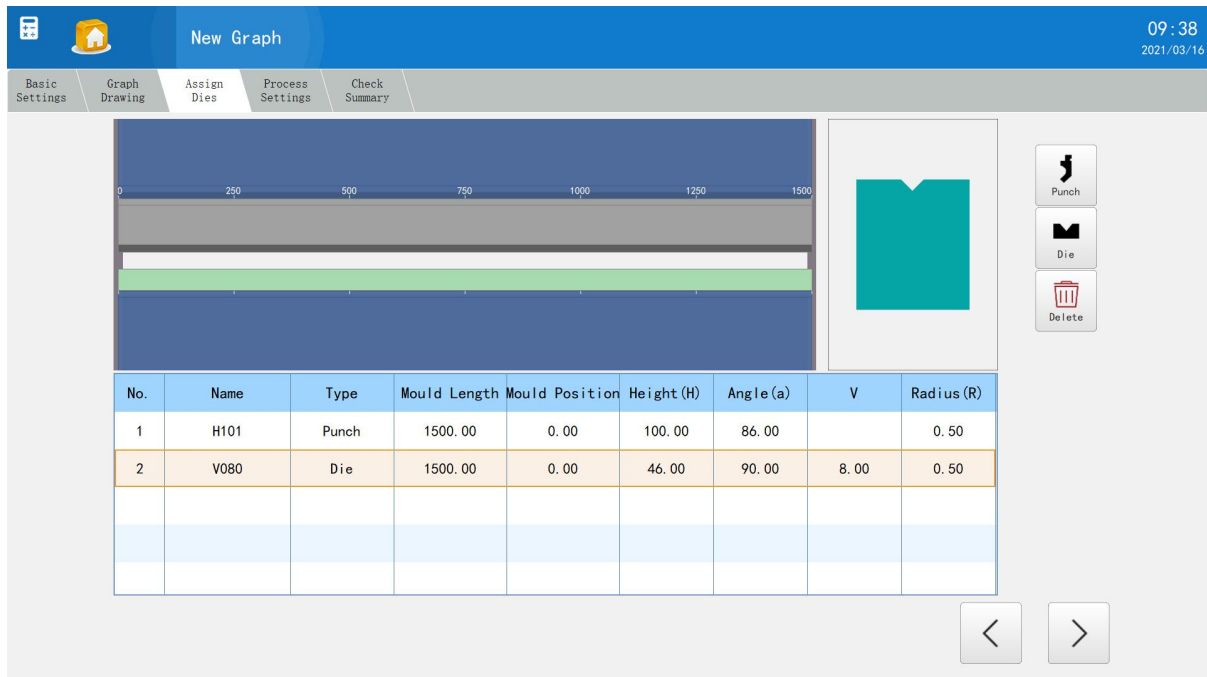
Scale down: Scale down the current shape.

Center: Move the current graph to the center of the screen.

Set-up - Angle specification: if enabled, then the new bending Angle automatically corrected to 45 degrees of integer multiple; If off, any bending Angle will be generated based on the position of the touch click.

Setting-Sensing Range: The larger the range is, the easier it is to select an edge or corner. The smaller the range, the harder it is to select. Graphics zoom in or out, the induction range remains the same.

After drawing the side graphics, click the button on the right below  to enter the interface of mold configuration. As shown in Figure 2.2-5.



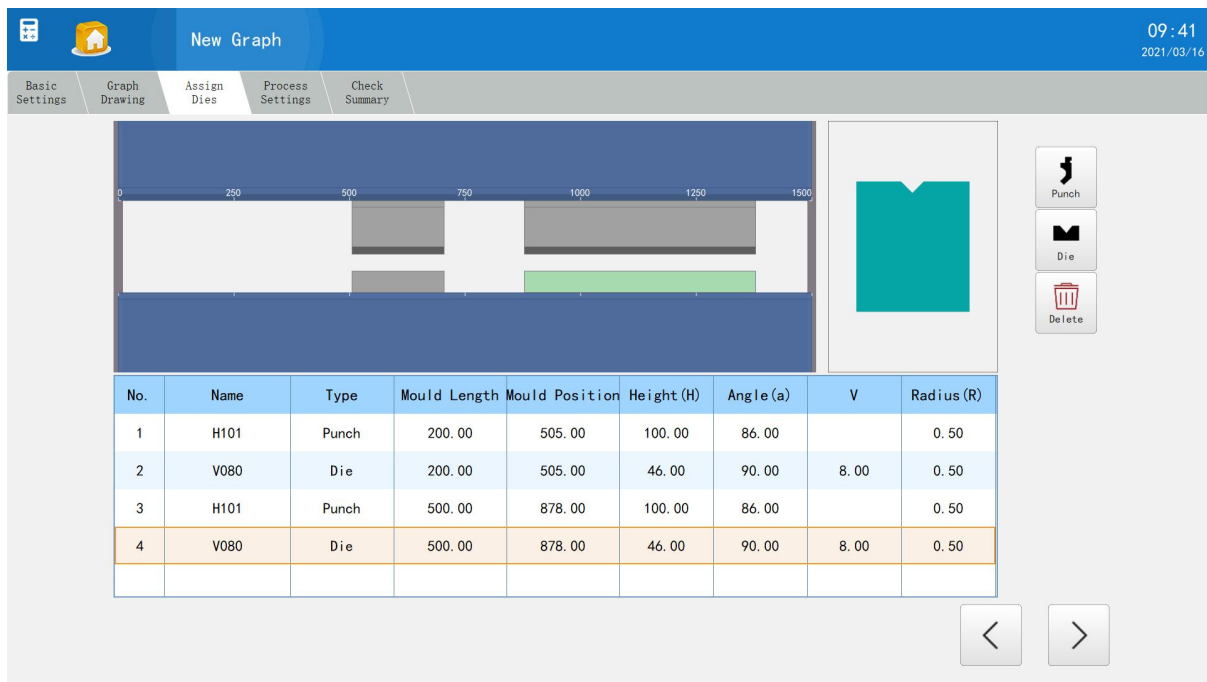
2.2-5 Distribution of the mold

The upper part of the screen on the left side shows the front view of the machine tool, showing the following main parts of the machine tool in the order of top to bottom: slider, upper die fixture, upper die, lower die and work table. The cross section diagram of the currently selected mold is shown on the right side.

The lower part of the screen shows the mold data, and the added mold can be modified by clicking.

On the right is the function key. Click the Upper Mold to enter the Upper Mold Library. You can select the Upper Mold you want to add. Click the lower mold to enter the lower mold library, you can choose the lower mold you want to add; Select the added mold and click Delete to delete the mold.

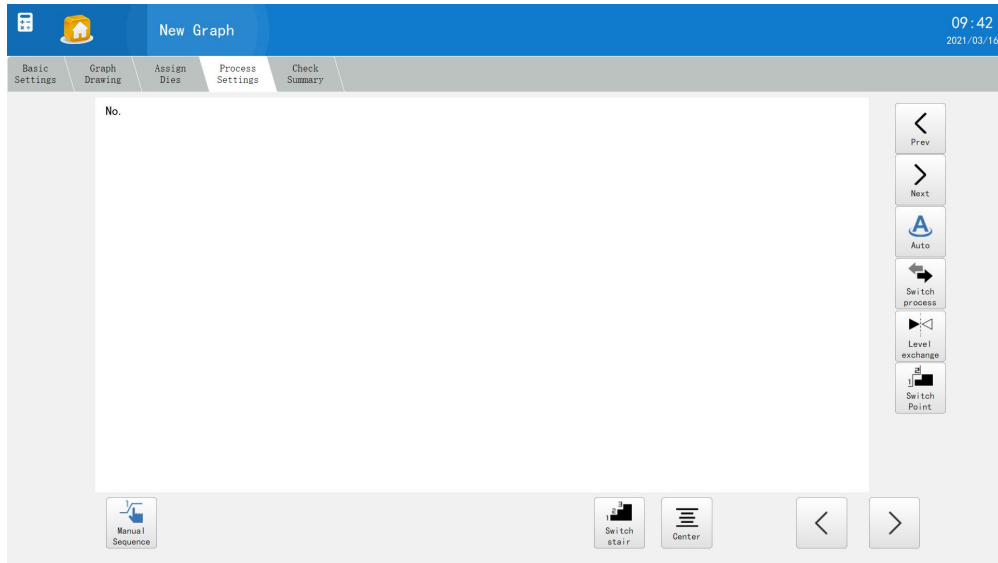
Modify the mold length and position: select the item to be modified in the mold data list, and re-enter the new value. After the modification, the upper diagram will be updated in real time, as shown in Figure 2.2-6.



2.2-6 Die editor

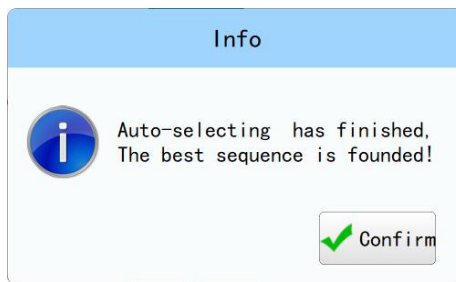
Click the lower right button  to enter the interface of process assignment.

As shown in Figure 2.2-7.

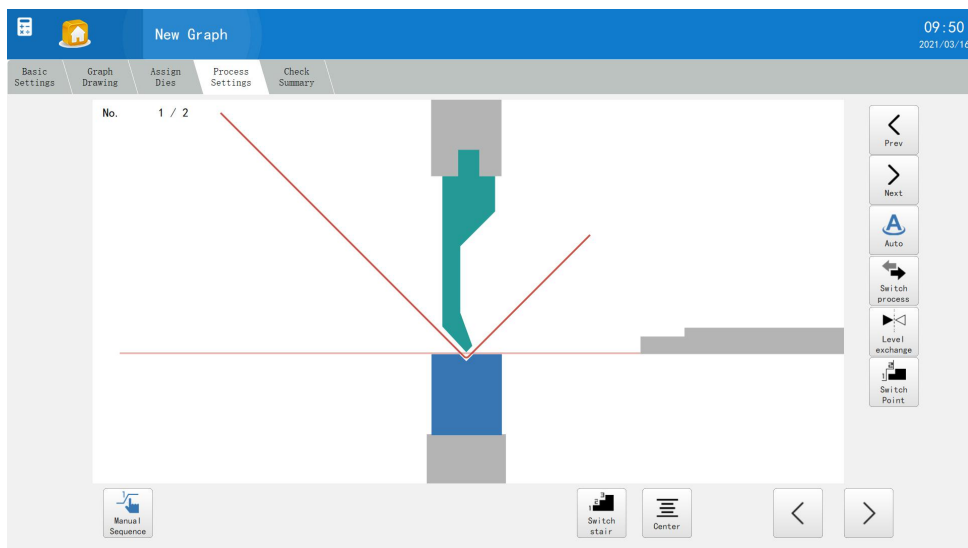


### 2.2-7 Process distribution

Click the automatic button on the right, and the system will check whether there is an effective process.



### 2.2-8 Find the Effective Process



### 2.2-9 Process distribution display

The above figure is the working procedure distribution interface of the product. The center of the screen shows the side processing diagram of specific working steps, including the product before and after bending, as well as the graphics of upper and lower die, finger block and so on. The top shows the current working step number, the shape before bending is expressed in light red, and the shape after bending is expressed in deep red.

Click "Upper turn" and "Lower turn" to switch the current turn.

Create a new graphic product. When entering the process assignment interface for the first time, click "Automatic". The system will search for the effective process of the product, select the optimal process from the effective process set, and assign it to the current product.

Effective working procedure basic principle: every working step of the product, before bending, after bending graphics itself can not collide, before and after bending graphics and upper and lower die, table, slider can not collide, there is an effective finger block.

Fundamentals of the optimal process: minimize the processing time of simulation evaluation, change the mold as little as possible, turn the workpiece up and down as little as possible, and turn the workpiece back and forth as little as possible between different work steps.

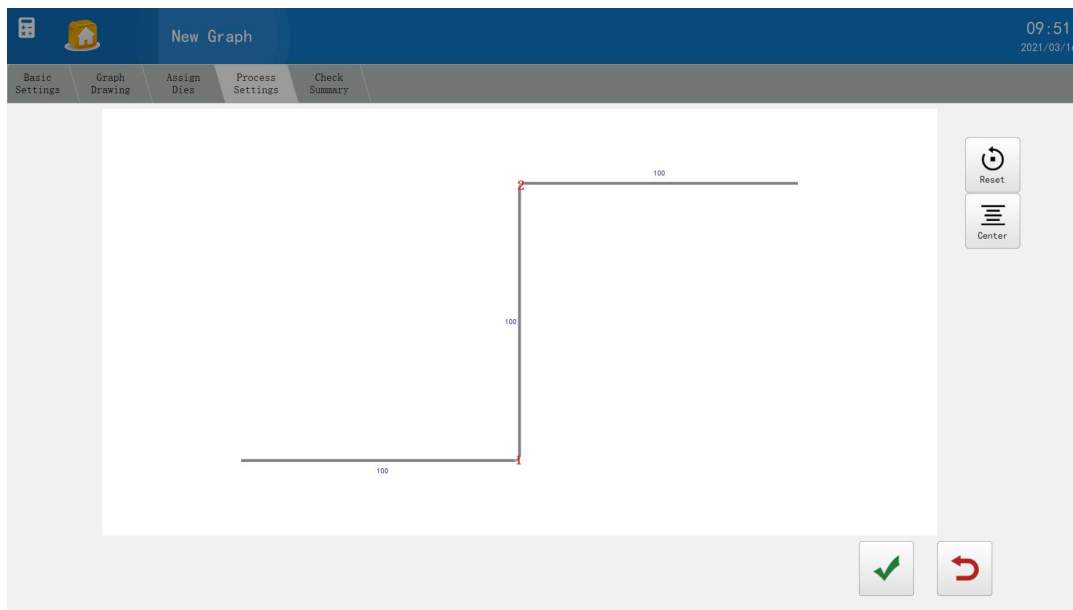
If you are not satisfied with the process automatically assigned by the system, you can fine-tune the process. "Horizontal exchange", the workpiece will be left and right exchange, the block position will change.

"Cut and shift point" and "Cut and shift order" can change the position of the current shift point and shift order. You can also click "Automatic Process" again, and

the system will switch between the five (maximum) processes selected by the first automatic process.

The automatic process calculation can be divided into two types: the optimal mode and the fast mode. The fast mode can save the time of finding the process, but the found process may not be the optimal process. When quick mode does not find a valid process, use preferred mode.

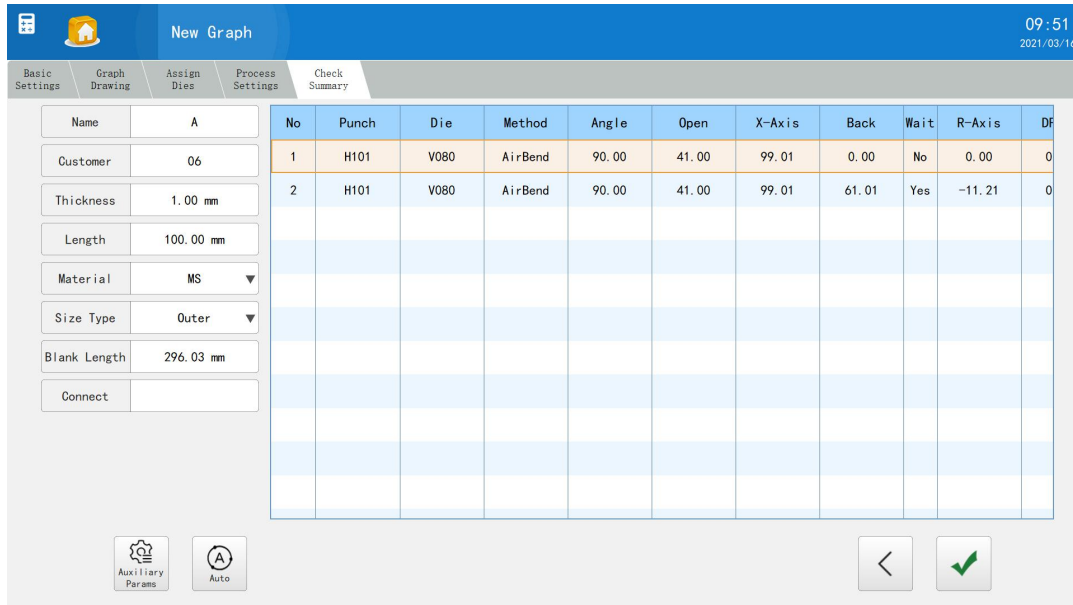
If you are familiar with the process distribution of the product and have a clear understanding of the product steps to be processed, you can use the "manual selection process" to manually assign the processing steps. Click the bending vertices one by one to construct the bending process. As shown in Figure 2.2-10.



2.2-10 Hand picking process

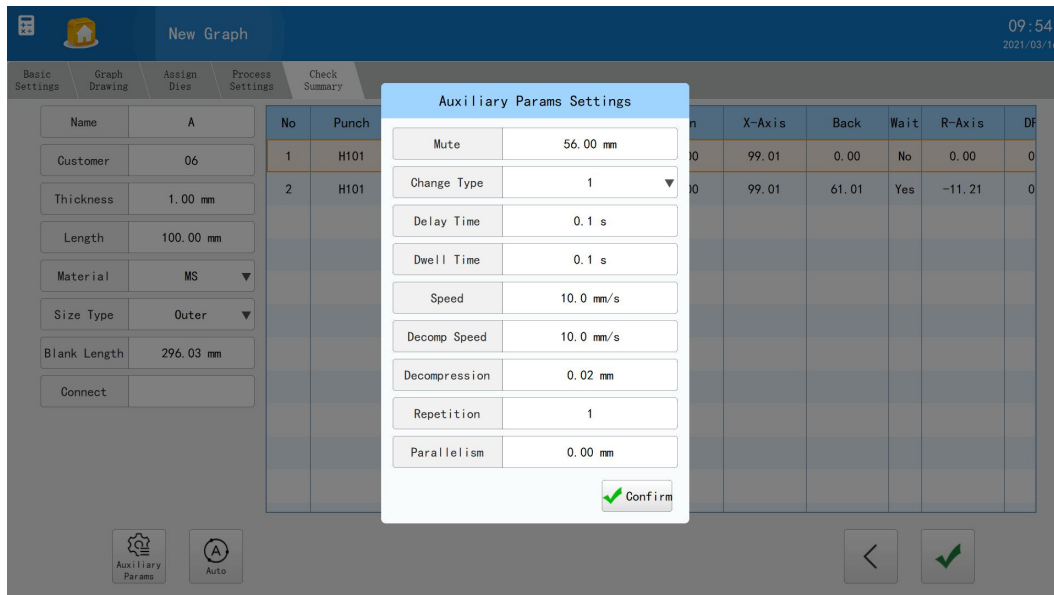
If the manual selection process is wrong, you can click "Reset" to re-select the process.

After the process assignment is completed, click "Next" to enter the graphical product summary interface. As shown in Figure 2.2-11.



### 2.2-11 Graphic Product Summary

The system assigns default parameters to each turn. If you want to modify the parameters of a single turn, you can directly click the parameter to modify it, or click the button of auxiliary parameters at the lower right to modify more parameters, as shown in Figure 2.2-12.



### 2.2-12 Auxiliary parameters

All parameters of the graphic product have been modified and confirmed.

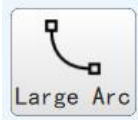
Please click "OK" to save the product.





After setting, it can be seen that the original working procedure number of ordinary bend is changed from singular to the combined mode of "total working ordinal number - large arc working procedure number", and marked with \*.

#### 2.3-4 Set the large arc bending 2

If large arc bending is not required, select the bend  and click again to select Convert to Normal Bend.

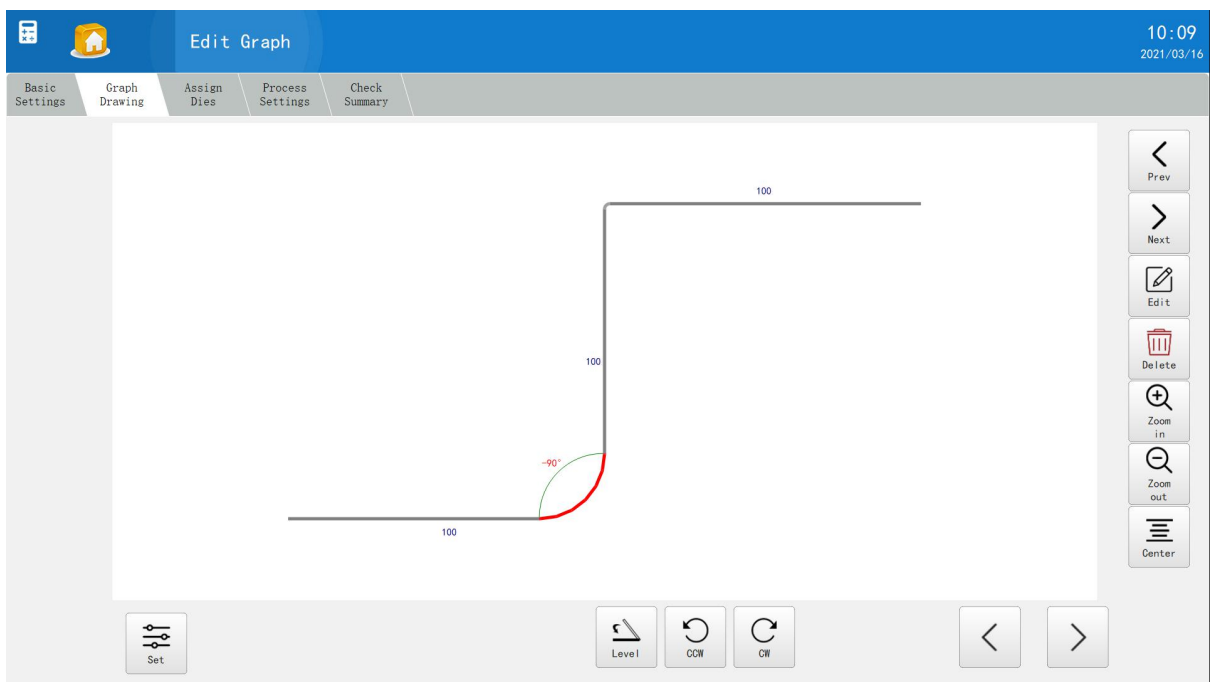
### Graphical products with large circular arc bending

If big circular arc bending, so in the new graphics products - graphics, click a vertex, select the corners, and then click edit, in the bending properties of the pop-up box, set the bend types for the big circular arc bending, and can set the bending radius, the section number (the scope of the section number 3 ~ 30), click "ok" to complete the big circular arc bending property is set. This is shown in Figure 2.3-5.



2.3-5 Large arc bending setting

Large circular bending is shown in Figure 2.3-6:

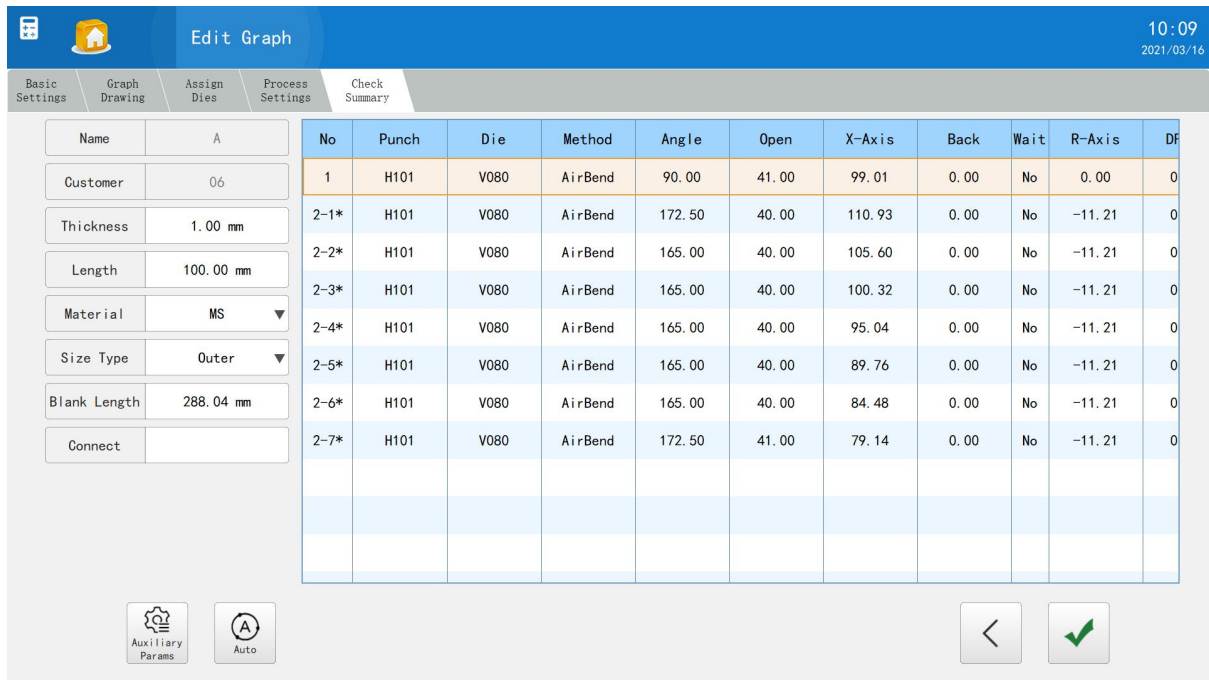


2.3-6 Large arc bending graph drawing

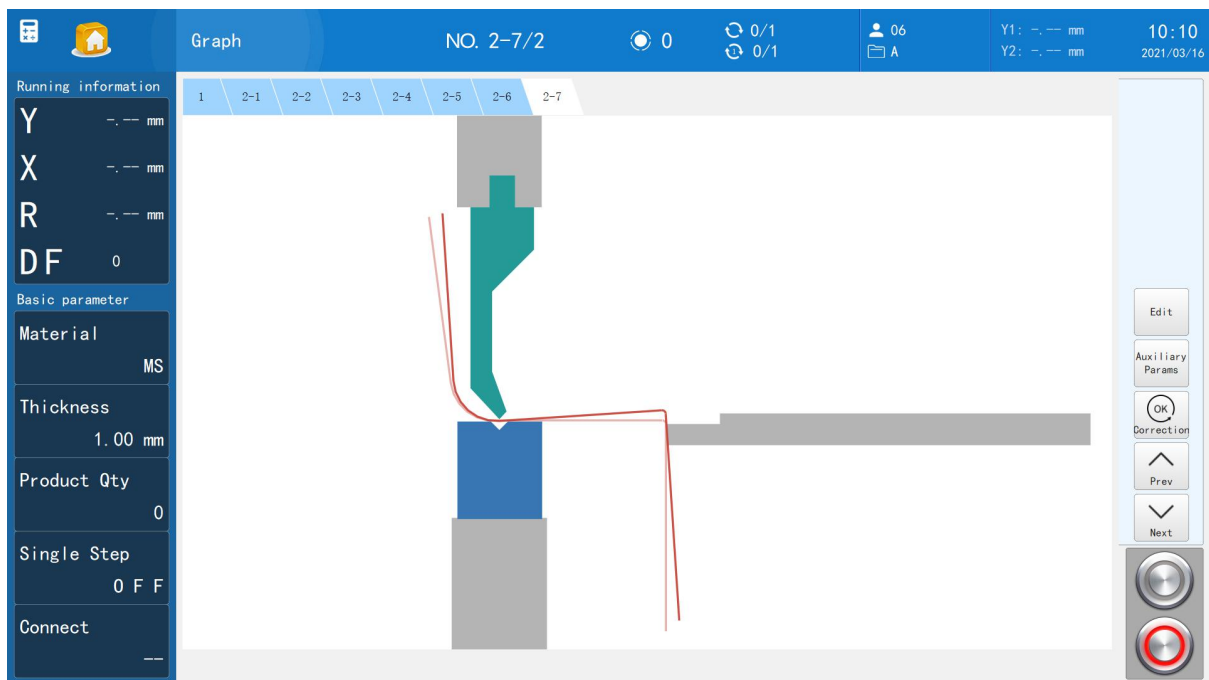
The mould distribution and working procedure distribution of large arc bending are the same as that of general graphic products, which will not be described further.

In the graphical product summary interface, as shown in Figure 2.3-7, 4-1\* to 4-7\* are the large arc bending process just set. The system has automatically

calculated the relevant parameters of all the processes, and the product can be automatically run by clicking on it, as shown in Figure 2.3-8.



2.3-7 Large arc graphic product summary interface

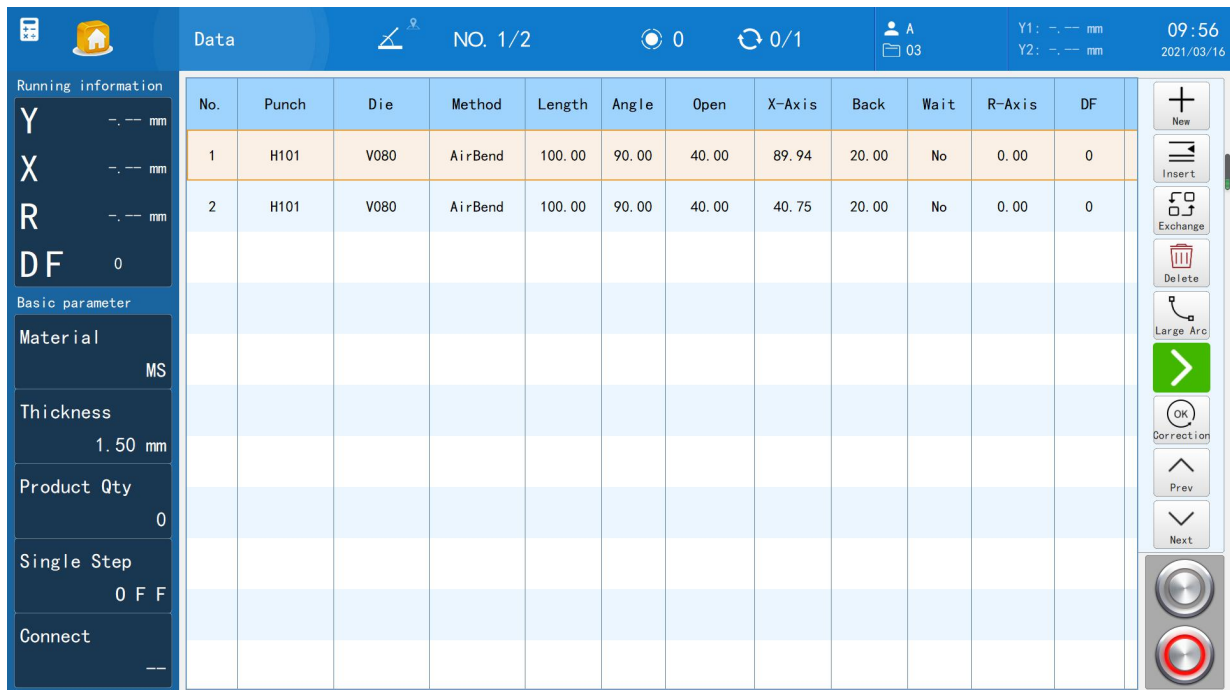


2.3-8 Large Arc Auto Run - Graphic Mode

## 3.Run the product

### 3.1 Data products


In the main interface, select a specific data product and click "Processing" to run the data product, as shown in Figure 3.1-1. The system will automatically detect the product parameters. If there is any abnormality, it will indicate that the error cannot be run. You need to check the relevant parameters according to the error, and then the bending can be run after modification.



3.1-1 Data product operation interface

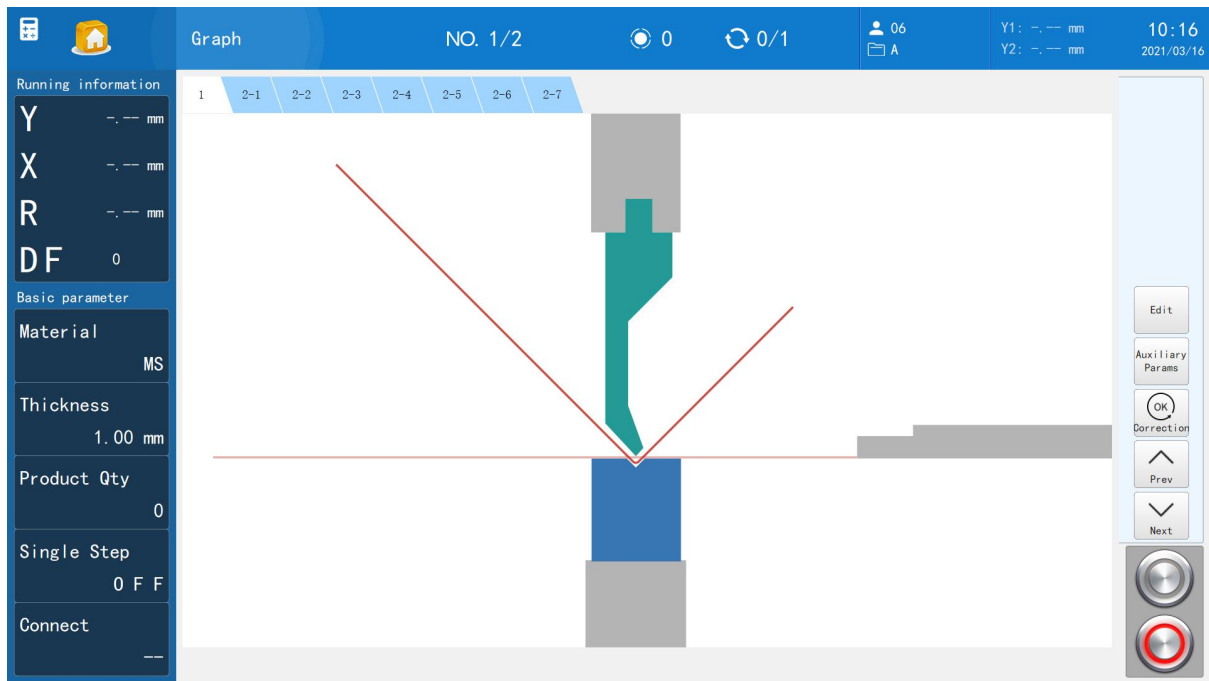
The editing and running interface of the data products of the system is the same interface. Please refer to 2.1 Data Products in Chapter 2 Product Creation and Editing in the Manual for details.

Press the "Run" button  at the bottom right to start processing the product.

The "Run" button appears green. Press the "Stop" button  to terminate product processing. The stop button appears red.

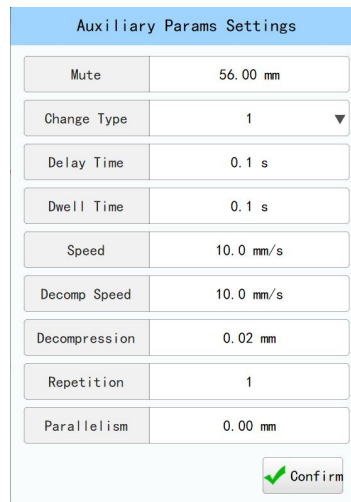
### 3.2 Graphical products

In the main interface, select a specific graphic product and click "Auto" to run the graphic product. The system detects the product parameters. If there is any abnormality, it will prompt an error. If the detection passes, it will enter the graphical product operation interface.



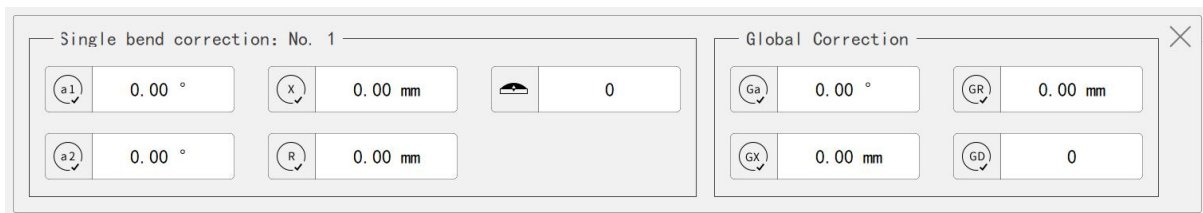
3.2-1 Graphic product run - Graphic mode

As shown in Fig. 3.2-1, the side processing diagram of the current working step is displayed in the center of the screen. The information of bending serial number, status, number of cycles, customer name, product name, Y1, Y2 and so on are displayed on the top.





### 3.2-2 Auxiliary parameters

Auxiliary parameters: As shown in Figure 3.2-2, auxiliary parameters can be set and take effect immediately after parameter modification. Detailed description of each parameter can be found in Chapter 2 Product Creation and Editing 2.1 Data Products.



### 3.2-3 correction

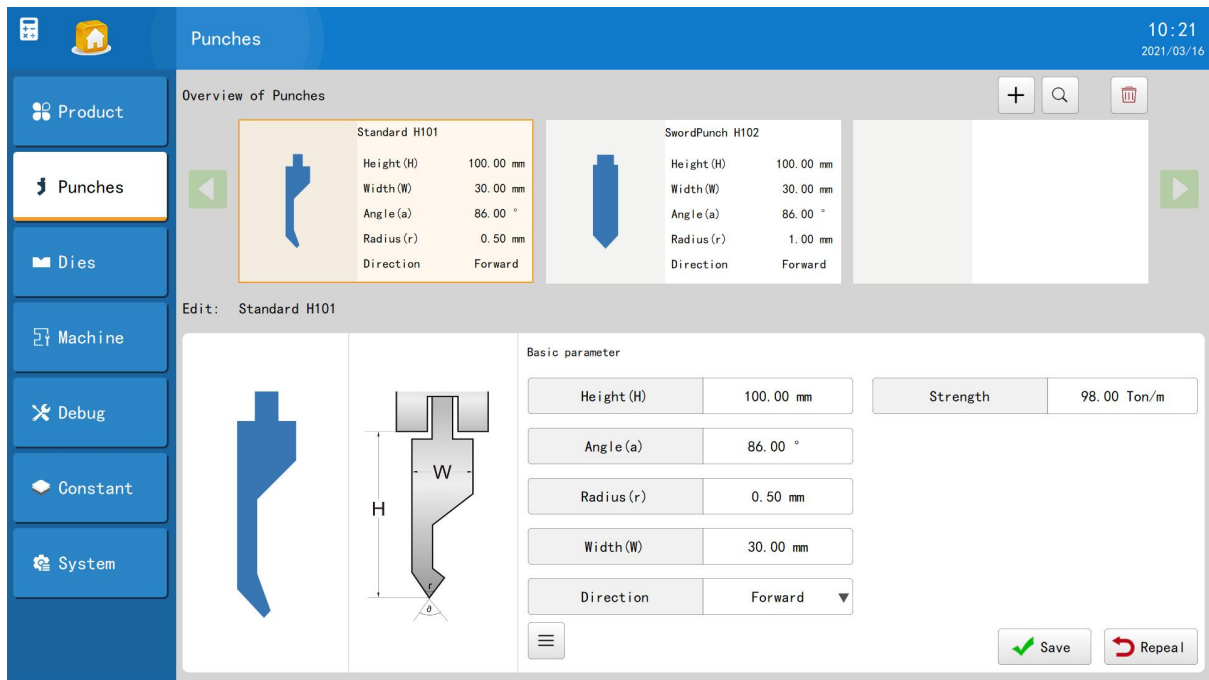
Correction: As shown in Figure 3.2-3, you can view or modify the correction value for the current curve, or set the global correction value for all curves. Calibration parameters will take effect immediately after modification.

Press the "Run" button  to start processing the product. The "Run" button appears green. Press the "Stop" button  to terminate the processing of the product. The stop button will appear red.

## 4. Die set

### 4.1 Upper mold setting


Click "Upper mold library" in the menu bar on the left side of the main interface to enter the upper mold configuration interface, as shown in Figure 4.1-1.



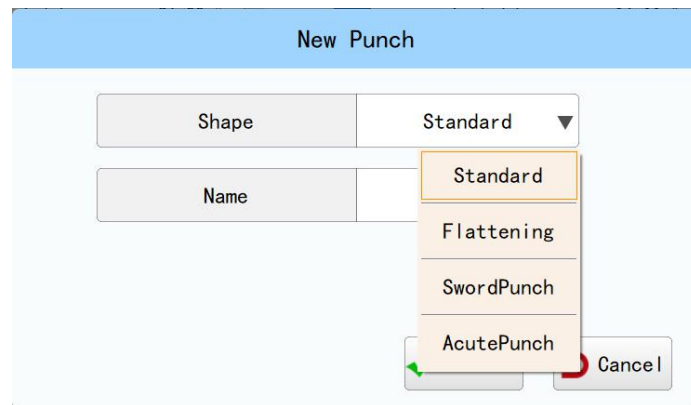
4.1-1 The configuration of upper die

The upper part of the interface is the list of the upper model that has been built in the system, the left side is the thumbnail of the upper model, and the right side is the basic parameters of the upper model. Each page displays 3 molds. Click the buttons on both sides to turn the page. The upper right provides new, search, delete functions.

The lower part of the interface is the editing area of the currently selected mold.

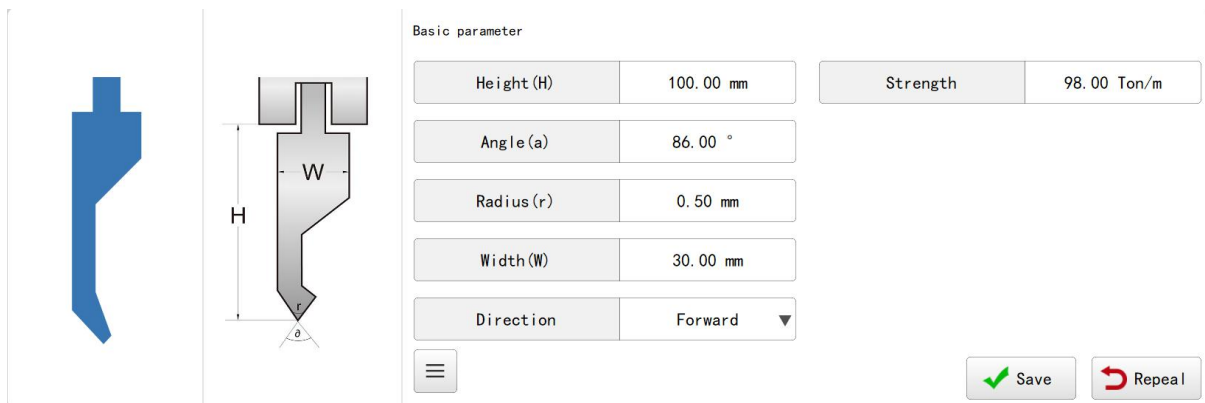
Click the parameters to be modified to reset, and click more button  to set the

auxiliary parameters of the mold. Confirm after modification and click Save button, the parameters will take effect immediately.



4.1-2 On the new mould

New upper die can choose the shape of the upper die, such as standard, flattened upper die, straight knife upper die, acute Angle upper die. Enter the name of the upper module and click OK to start editing the upper module data. The system provides the default parameters for the new mold. Click to modify them and save them after completion, as shown in the mold editing in Figure 4.1-3.



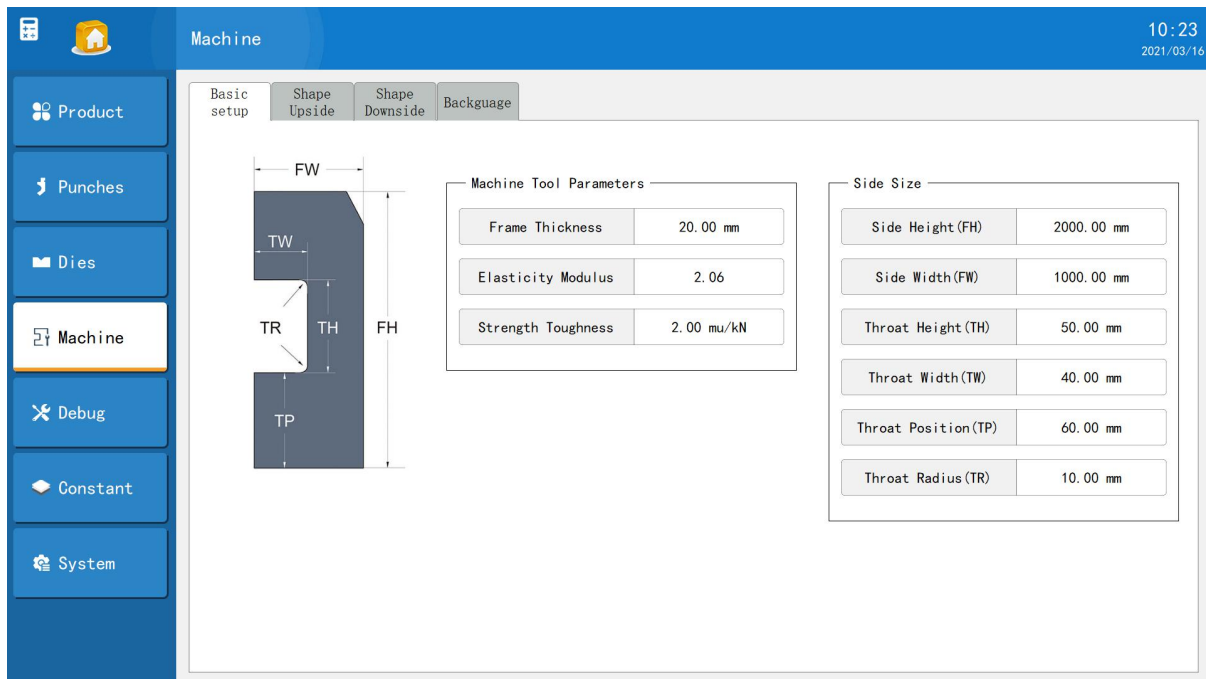
4.1-3 The editor of upper die

## 4.2 Lower mold setting

The specific operation process of the lower mold setting is similar to that of the upper mold setting, which will not be described here.

## 5. Machine set up

Click the machine tool setting from the left menu bar, you can open the machine tool setting interface, in which you can set the inherent parameters of the machine tool, finger block, etc. This is shown in Figure 5-1.



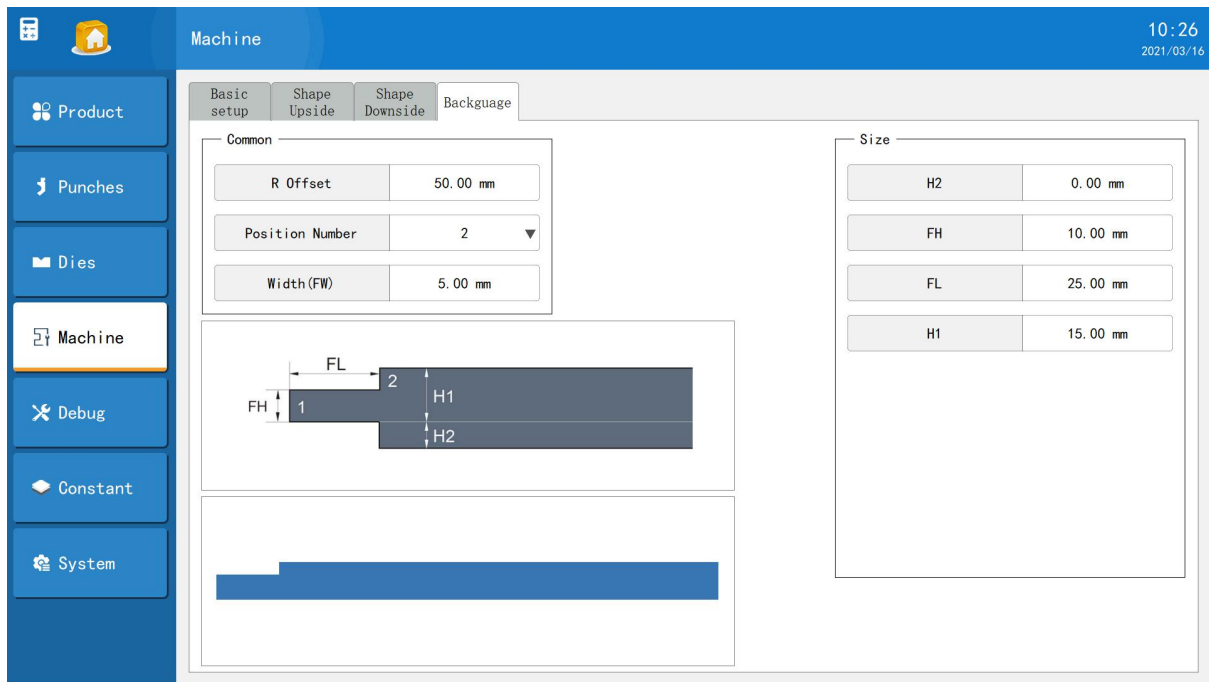
5-1 Machine set up

### 5.1 Set inherent parameters of machine tool

According to the operation manual of the bending machine tool, set the inherent parameters of the machine tool, including the upper shape, the lower shape, the side plate size, etc.

### 5.2 Block setting

Click "Block" on the machine tool setting interface to enter the rear block setting interface, as shown in Fig. 5.2-1.



### 5.2-1 Rear stopper set

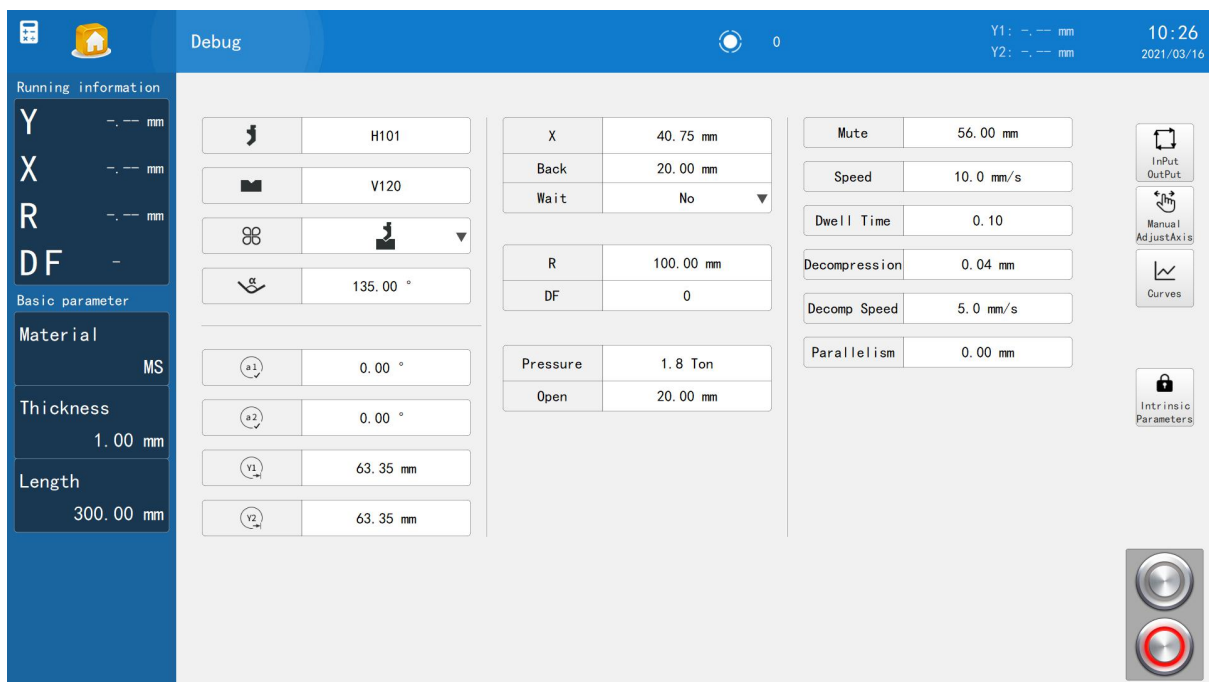
On the left is the general column, which can set the R-axis offset, that is, the lifting height of the rear stopper within the safe distance of the X-axis of the lower die. It can also set the number of stopper position and width of stopper finger. The number of block positions can be 1,2,3,4, that is, different block positions are used.

The lower left is the marking diagram of finger blocking. Fill in the parameters of finger blocking in the dimension bar on the right according to the marked position information. According to the change of parameters, the system displays the current shape model of the finger in real time.

## 6.debugging

Debugging, often used in machine tool debugging or simple processing of single bend, does not need to generate the product in advance to run the bending, but bypasses the product, directly input the bending parameters to run.

In the main interface, click the debugging function key to enter the debugging interface. This is shown in Figure 6-1.



6-1 debugging

### 6.1 Debugging parameters

As shown in the figure above, the top left of the page is the operation information of each axis, and the bottom left is the basic parameters of the product, such as material, thickness and width.

The information bar at the top of the page shows the running status of the slider after connecting the machine tool (such as fast down, work in, unloading, return) and the parameters of Y1 and Y2 axis.

In the center of the page, all parameters of the single-channel bend are set.

Default parameters are provided by the system. Click to modify them.

-Upper mold: currently using the name of the upper mold, click into the upper mold library to select the upper mold.

-Lower mold: now use the name of the lower mold, click into the lower mold library to select the lower mold.

-Bending type selection: free bending, bottom bending, flat bending, bottom pressing.

-Angle: Angle of bending

-Y1, Y2 Target values: the final bending position of the shaft slider.

-a1 correction: represents the Angle correction in the direction Y1 of the current bend;

-a2 correction: represents the Angle correction of the current bend in the direction Y2.

-X axis target value: the horizontal movement position of the rear stopper.

-Recede distance: the retreat distance of the back stopper during bending. The retreat of the back stopper begins at the clamping point of the sheet.

-Wait back: in case of concede, it is necessary to choose whether to make Y axis wait until the concede operation is completed. No: When making a concession, the Y axis will not wait for the concession to be in place

and will descend directly; Yes: In the concession, the Y axis waits for the concession to be in place before the slider comes down.

-R-axis target value: the vertical movement position of the rear stopper.

-Deflection: the balance displacement exerted by the jack when the beam of the machine tool is deformed, denoted by DA (automatically calculated by the system).

-Pressure: the maximum tonnage that can be adjusted when pressing (automatically calculated by the system).

-Opening height: the clearance opening before the upper and lower die.

-Speed conversion point: the conversion point from the fast lower speed of the slider to the work feed speed. The parameter set here is the distance of the speed conversion point above the sheet material. The value of the speed conversion point of the lower die is used by default.

-Work speed: Specifies the speed of the slider during work.

-Holding time: pause time of upper die at bending point.

-Unloading distance: the unloading distance after bending, used to release the working pressure.

-Unloading speed: prescribes the speed of the slider in the unloading stroke.

-Parallelism: The difference between the left and right cylinders (Y1, Y2). A positive parameter means that the right oil cylinder is lower than

the left, and a negative parameter means that the right oil cylinder is higher than the left. The set value is valid within the limit of the maximum parallelism of the internal parameter.

Press the "Run" button to start processing the product. The "Run" button appears green. Press the "Stop" button to terminate the processing of the product. The stop button will appear red.

## 6.2 Input and output state

Click "Input and Output" to enter the input and output state interface, as shown in Figure 6.2-1.

No.	CN3	CN4	CN5	CN6
1	24V	24V	24V	24V
2	Fast allow 0	X Ref Point 0	A/M 0	Die Clamp 0
3	Feed request 1	R Ref Point 1	Oil Pump 1	Material 1
4	Safe protect 1	Pedal 1	Change Step 1	IN 1
5	Mould tight 0	Return 0	Search 0	IN 1
6	IN 0	Slow <input type="text" value="0"/>	AD1 increase <input type="text" value="0"/>	TDC <input type="text" value="0"/>
7	IN 0	Fast <input type="text" value="0"/>	AD1 decrease <input type="text" value="0"/>	Unloading <input type="text" value="0"/>
8	IN 0	Transducer <input type="text" value="0"/>	OUT <input type="text" value="0"/>	Clamp Point <input type="text" value="0"/>
9	IN 0	Mute <input type="text" value="1"/>	Clamp Output <input type="text" value="1"/>	Auxiliary <input type="text" value="1"/>
10	OV	OV	OV	OV
Y1 Valve Opening	<input type="text" value="0 %"/>	Y1 =	AD1 =	Line Pressure <input type="text" value="0"/>
Y2 Valve Opening	<input type="text" value="0 %"/>	Y2 =	AD2 =	DF Pressure <input type="text" value="0"/>
X Analog	<input type="text" value="0 %"/>	X =	AD3 =	Servo pump <input type="text" value="0"/>
R Analog	<input type="text" value="0 %"/>	R =	AD4 =	DA <input type="text" value="0%"/>

6.2-1 Input output state

The input/output state function is used to debug the controller and view the state of the various parts of the controller. It is divided into two parts, read the controller state and send the control state to the controller.

The value of the input port is 0, 1, two control states.

Y1 valve opening, Y2 valve opening, X axis analog quantity, R axis analog quantity is the percentage value, the range is -100% to 100%.

The main pressure and deflection ranges from 0 to 255.


The interface contains two function keys: return and reset.

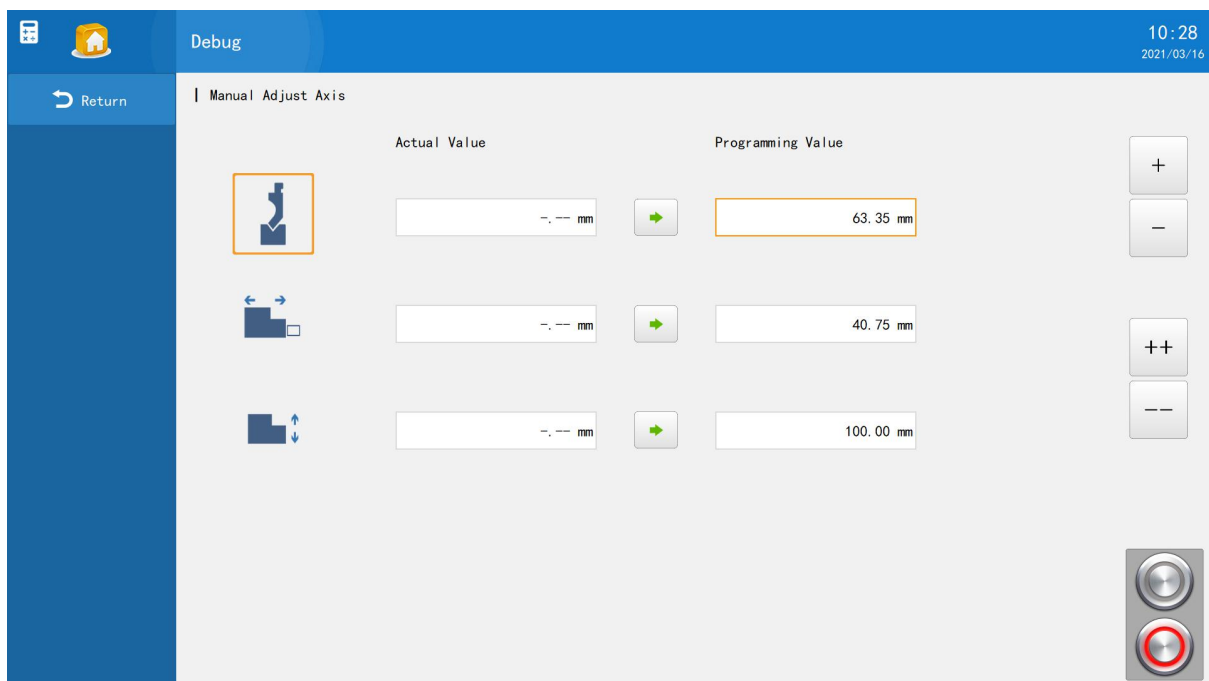
Return: Close the interface and stop acquiring the status.

Reset: control state is set to 0, Y1 valve opening, Y2 valve opening, X-axis analog value and R-axis analog value are set to 0%, main pressure and deflection value are set to 0.

### 6.3 Manual adjustment shaft

Click "Manual shaft adjustment" to enter the interface of manual shaft adjustment, as shown in Fig. 4.3-1. Run the machine to get the actual values of Y

axis, X axis and R axis. Click the button  to convert them into programming values. Click "Return" to enter the debugging interface, and you can view the programming values of Y axis, X axis and R axis.

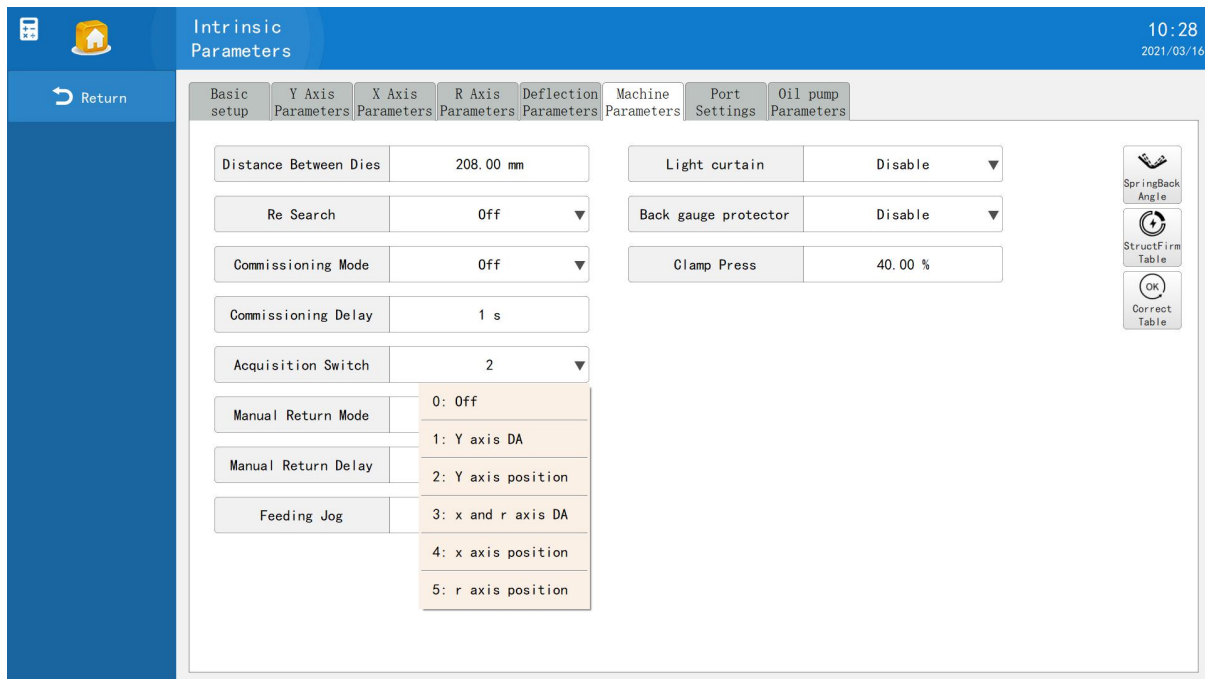


6.3-1 Manual adjustment shaft

Before the manual adjustment, first turn the "automatic/manual" switch to the manual position, and select the shaft to be adjusted. In the running state, only the Y axis can be adjusted by stepping on the foot to move the Y axis to the position of the speed conversion point, and then stepping on the foot all the time to change the Y axis position by "+" and "-". Under the stop state, only X axis and R axis can be debugged. Click "+" and "-" to change the actual values of X axis and R axis. Compared with "+" and "-", "++" and "--" can significantly increase the movement speed of Y, X and R axes.

## 6.4 the curve

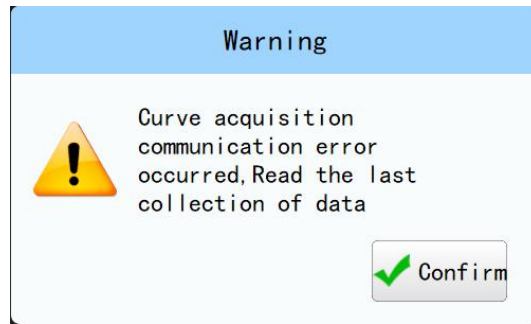
Before curve drawing, collection options should be set in the page of Debugging - Internal Parameter - Machine Tool Parameter, as shown in Figure 4.4-1:



6.4-1 Acquisition switch

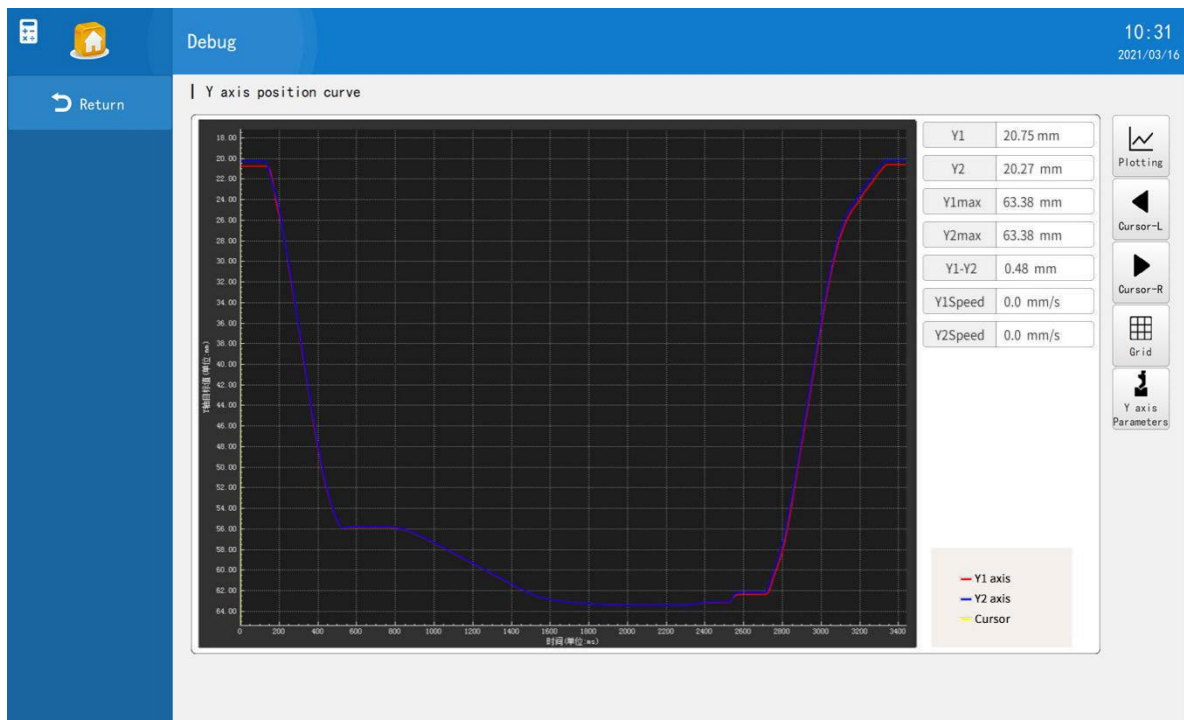
0 is to close the collection, so new curve data cannot be obtained at this time. 1-5 corresponds to the data of six different curves, which are Y axis DA, Y axis position, X axis R axis DA, X axis position, and R axis position.

After the acquisition switch is configured, such as "2: Y axis position", run a bending under the hand control interface and enter the curve interface to draw the curve. Note that curves are drawn using data from the last bend. If the controller is not connected, the curve will be drawn using the last successfully saved history acquisition data. This is shown in Figure 6.4-2.



6.4-2 Abnormal communication in curve acquisition

If the controller is connected and communicates normally, click "Draw Curve", the progress bar will appear directly, and then draw the Y axis position curve. This is shown in Figure 6.4-3.



6.4-3 Y position curve

The curve page is divided into two parts, the left is the curve coordinate system and information display box, the right is the function key bar. The lower right corner of the information box is the curve legend, which respectively identifies the color of the curve and the light standard.

Click the coordinate system directly on the touch screen to move the cursor to the corresponding horizontal position of the curve, and the corresponding data information in the information box will be refreshed and displayed. When fine-tuning, use the curve page cursor move button left and right, you can slightly adjust the cursor on the curve in the horizontal range of movement.

Display grid function button can display the grid grid of the coordinate system, easy to read the data of the coordinate system. Click the raster function button again to restore the original coordinate display state without raster.

The curve page is associated with the shortcut function button of the internal parameter of the shaft, which is easy to adjust the shaft parameters. If the internal parameter password lock is not opened, the data verification password is needed here to enter the shaft configuration.

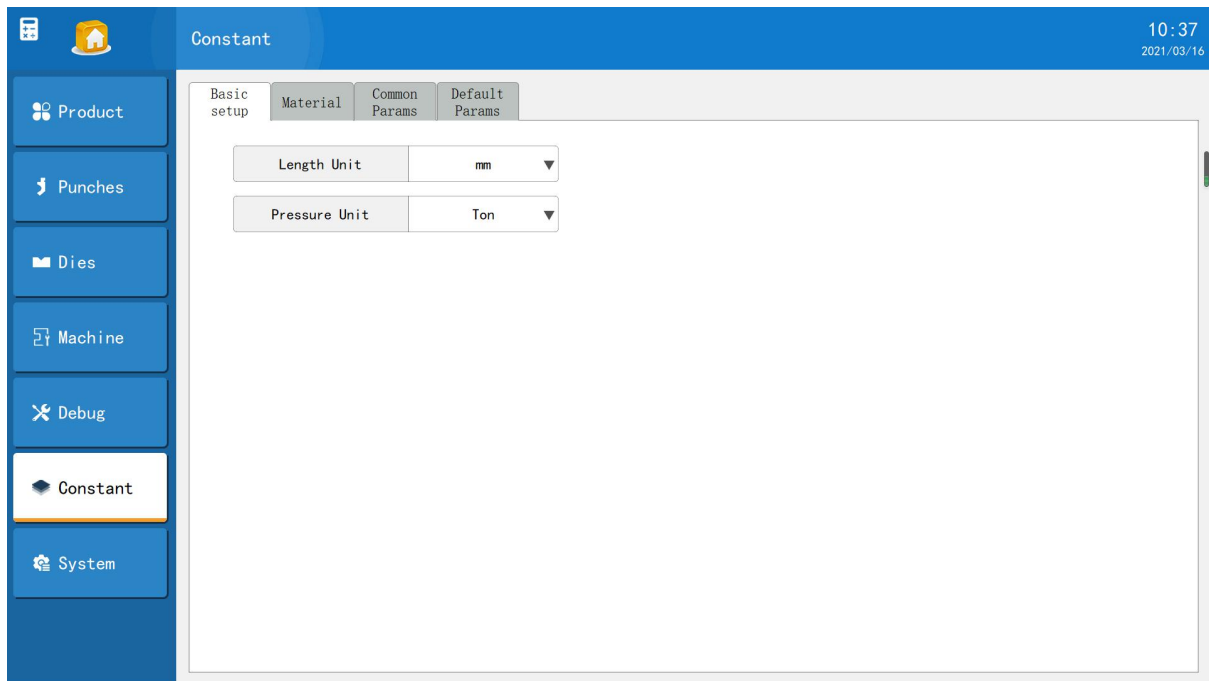
## **6.5 combination lock**

Access and configuration of internal parameters of the system is equipped with internal parameter password lock, the default password is "123".

The password lock will automatically open after verification. No need to input the internal parameter interface next time. After restarting, the lock state will be restored automatically.

## 7.Constant set

Click the constant setting function key in the system menu to enter the constant setting interface, as shown in Figure 7-1.



7-1 Constant set

Users can change the system length and pressure unit, such as:

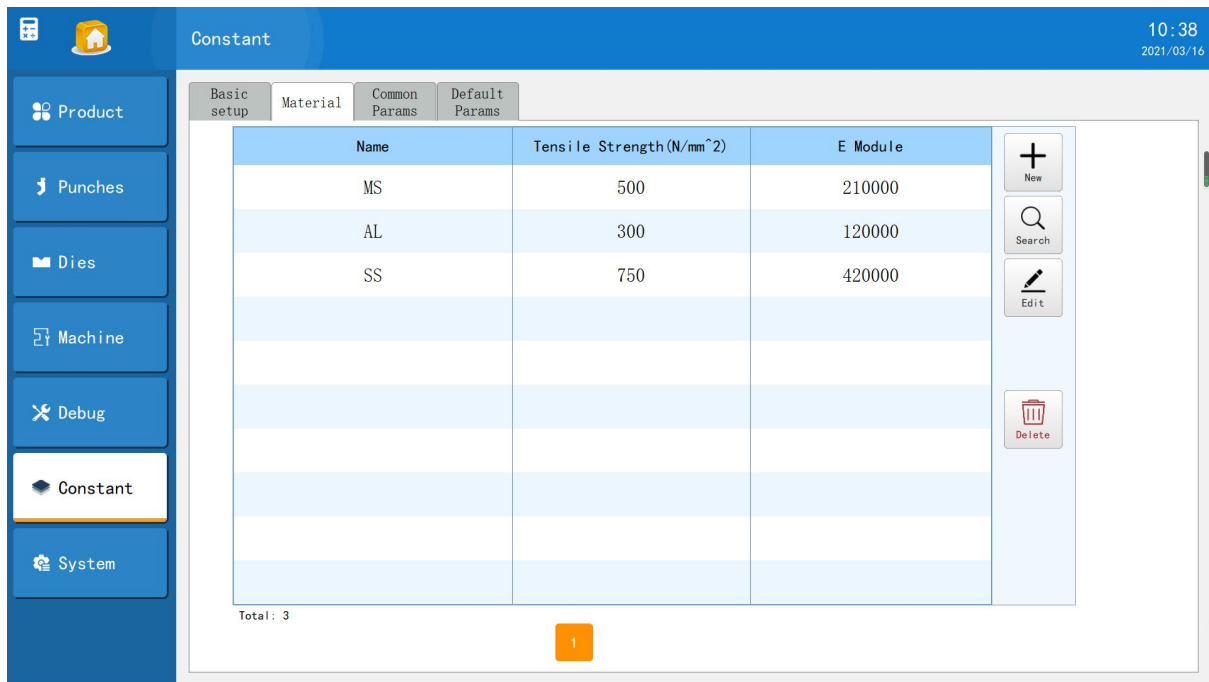
Length unit: mm ; inch.

Pressure unit: kN ; Ton.

After the system unit switch, all the parameter values and units related to length and pressure will change, but the values converted to SI units will not change.

### 7.1 Material set

On the main page of constant setting, click on material to enter the material setting page. This is shown in Figure 7.1-1.

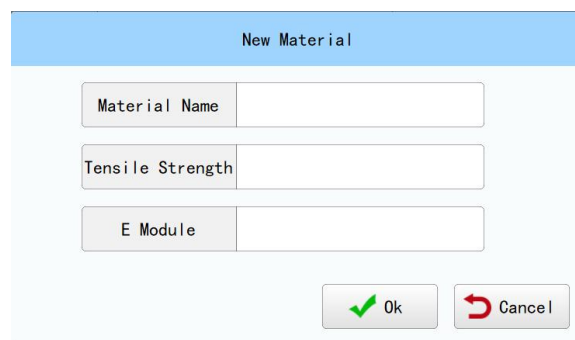


7.1-1 Material set

The list of material Settings page shows the list of materials for the system.

Page number button below: you can turn the page to display the material list page (each page can display up to 10 material records).

New button on the right: add a new material record, as shown in Figure 7.1-2.



7.1-2 The new material

Where, the material name can be letters (case), numbers, special symbols (Spaces, commas, etc.).

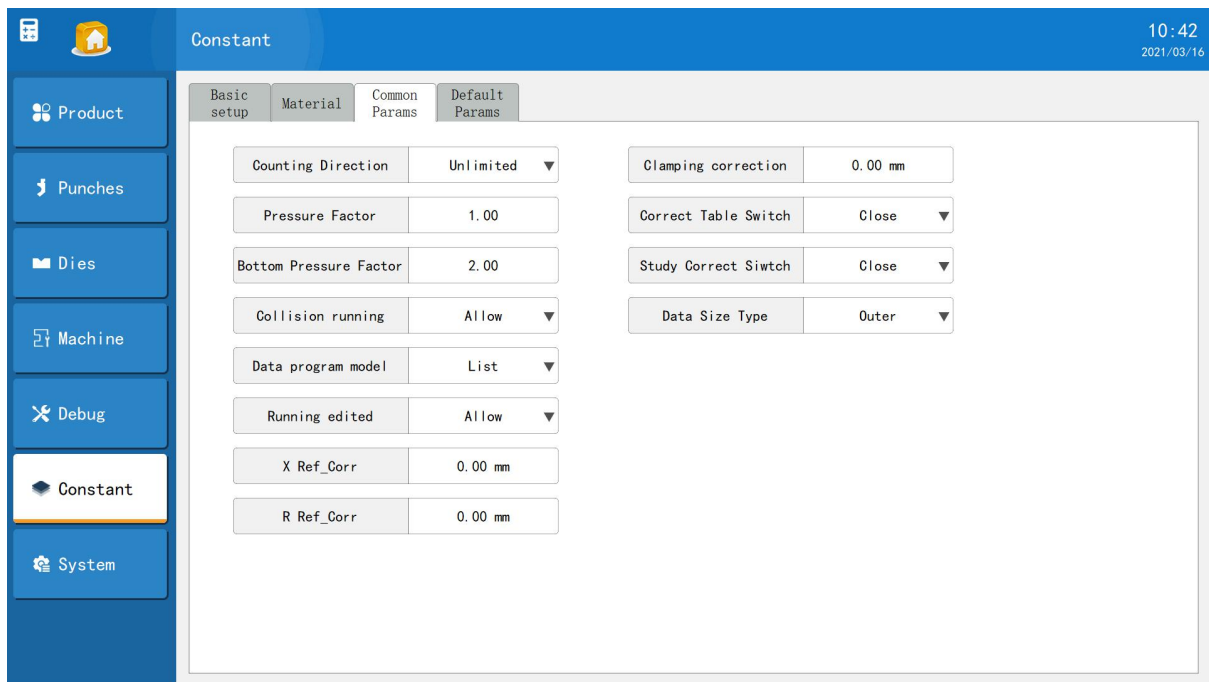
Find: Enter the name of the material for the search operation.

**Edit:** After selecting a certain material, edit the modified material in the same way as the new material.

**Delete:** After selecting a material, use the Delete button to delete the material.

## 7.2 General parameter setting

In the constant setting interface, click "General Parameters" to enter the general parameter setting window. As shown in Figure 7.2-1.



7.2-1 General parameter setting

-Direction of product counting: you can choose plan and unlimited. Plan means you must input the number of products before running the product. Unlimited means you can run the product directly and the system can count automatically.

-Pressure factor: pressure correction factor.

-Bottom bending pressure factor: the product of pressure automatically calculated during free bending and this parameter.

-Graphic Product Interference Operation: Optionally Allow or Disallow.

Allows: the bending workpiece and the upper die (or lower die), the upper shape (or lower shape) interference can also be bent; Prohibition: bending is not allowed when the above interference occurs. The system will give a prompt message.

-Data programming mode: Optional navigation or list mode. In navigation mode, new data products need to be edited item by item according to working procedure sequence; In list mode, all procedures of the data product are displayed on the same page in the form of list, which can be edited arbitrarily (list mode is used by default in the system).

-Runtime Editable: Optionally allow or disable editing at runtime (the default is allowed).

-X axis reference point correction: when the actual mechanical position of X axis is inconsistent with the displayed value of the system, correction can be carried out by modifying this parameter.

-R axis reference point correction: when the actual mechanical position of R axis is inconsistent with the displayed value of the system, this parameter can be modified for correction.

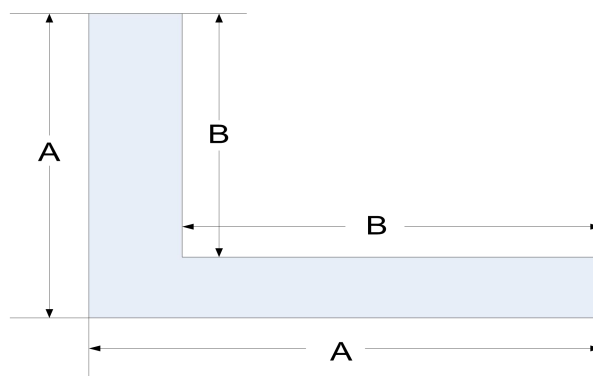
-Calibration of clamping point: the position of clamping point is the Y axis position automatically calculated by the system when the sheet material is clamped. In order to clamp the sheet more firmly, this position

can be corrected, which is the clamping point correction. Calibration range: 0.00~5.00mm.

-Calibration table switch: if set to on, the Angle correction database function is used, and the runtime system will automatically check whether there is an Angle correction in the database for this type of bending. If the corresponding correction value is found, it will be used in the calculation of the depth of bending.

-Correction learning: select the function of correction learning to be turned on, and the system will enter the learning mode on the debugging page. Enter A1, A2 correction, and then click Run, then the correction value corresponding to this kind of bending can be recorded in the Angle correction database.

-Data size type: including external size, internal size two. As shown in Figure 7.2-2, the product consists of two edges, A representing the outer dimension and B representing the inner dimension.



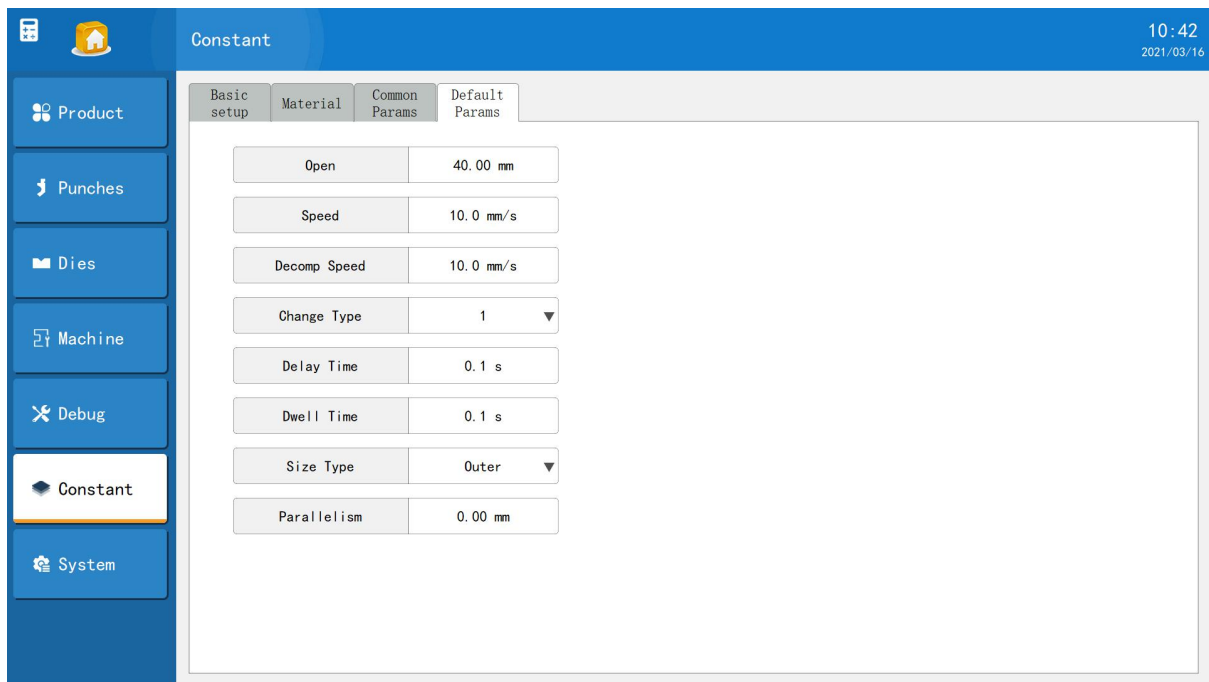
7.2-2 Inner dimension and outer dimension are indicated

Note: General parameters take effect immediately after the input box is set.

## 7.3 Default parameter Settings

In the interface of constant setting, click "Default Parameters" to enter the interface of default parameter setting. As shown in Figure 7.3-1.

Default parameters The parameters set by the interface are used to import the default data when the new product is bent. Their setting range is determined by internal parameters or the inherent Settings of the machine tool.



### 7.3-1 Default parameter Settings

-Opening height: clearance opening between upper and lower dies after bending.

-Work speed: Specifies the speed of the slider during work.

-Unloading speed: prescribes the speed of the slider in the unloading stroke.

-Step change mode: used to decide when the next bend is effective after bending, that is, when the step change. Possible values are:

1 = Change step when the slider reaches the upper dead center;

2 = Change step when the slider reaches the upper dead point and the external signal is valid.

-Shift Delay: Delay time before shift.

-Holding time: pause time of upper die at bending point.

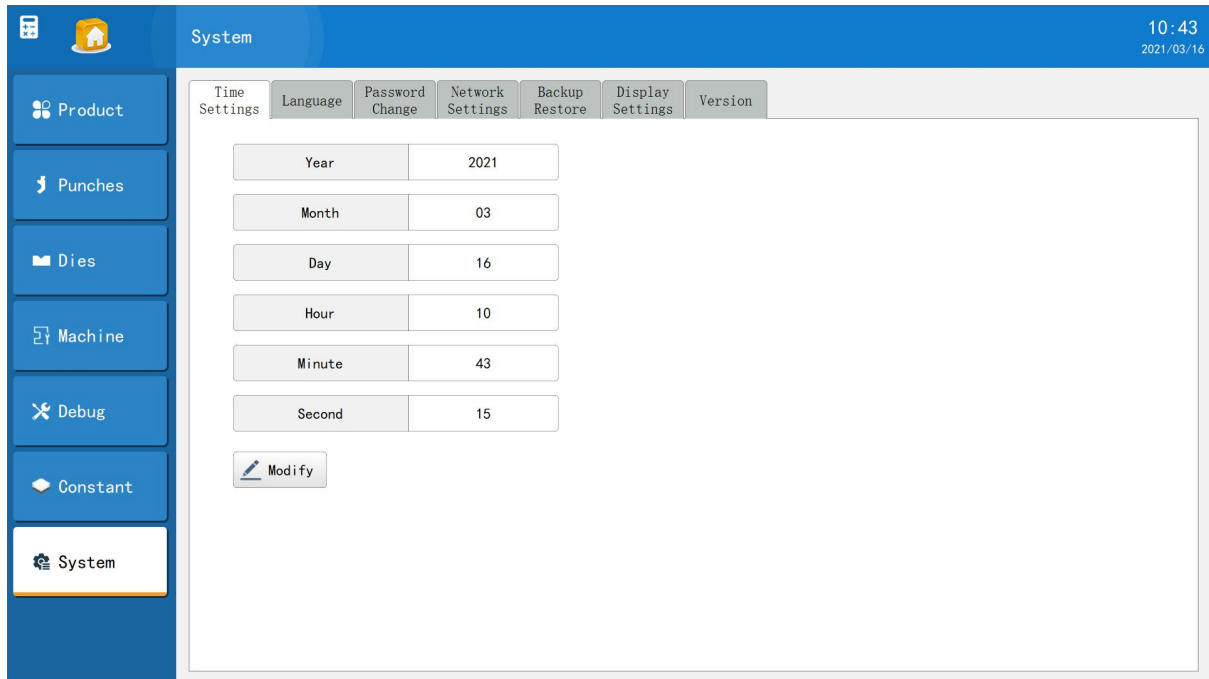
-Size types: The size types of graphic products are divided into outer size and inner size.

-Parallelism: The difference between the left and right cylinders (Y1, Y2).

**Note: Programming default parameters take effect immediately after the input box is set.**

## 8. System Settings

Click the system setting function key in the main interface menu to enter the system setting function interface. This is shown in Figure 8-1.



8-1 System Settings

### 8.1 Time setting

Click the "Modify" button in the time setting bar to modify the time information, and then click "Save" to complete and take effect.

Note: This system time is not allowed to modify arbitrarily.

## 8.2 Language Settings

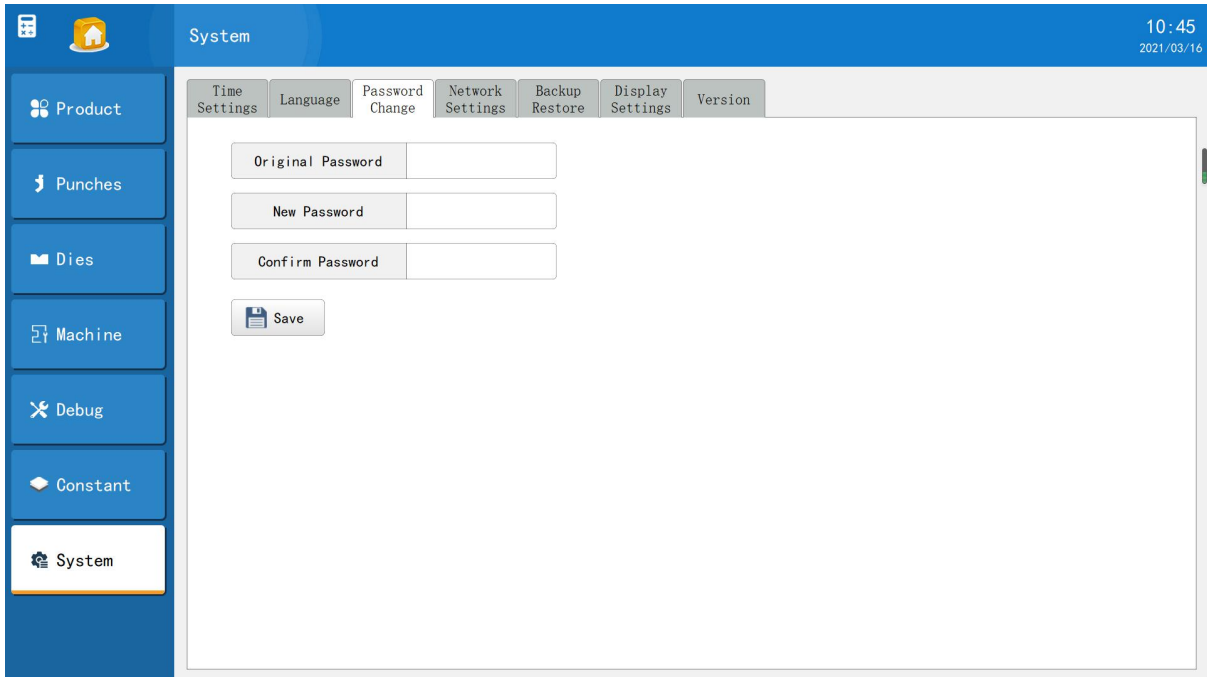
Click on Language in System Settings to reset the current language, for example, to Chinese. The Chinese system is shown in Figure 8.2-1.



8.2-1 Chinese interface

## 8.3 Password change

Click "Password Modification" to modify the password of internal parameters of the system, as shown in Figure 8.3-1. This password is used for validation when configuring internal parameters. The initial system password is 123.

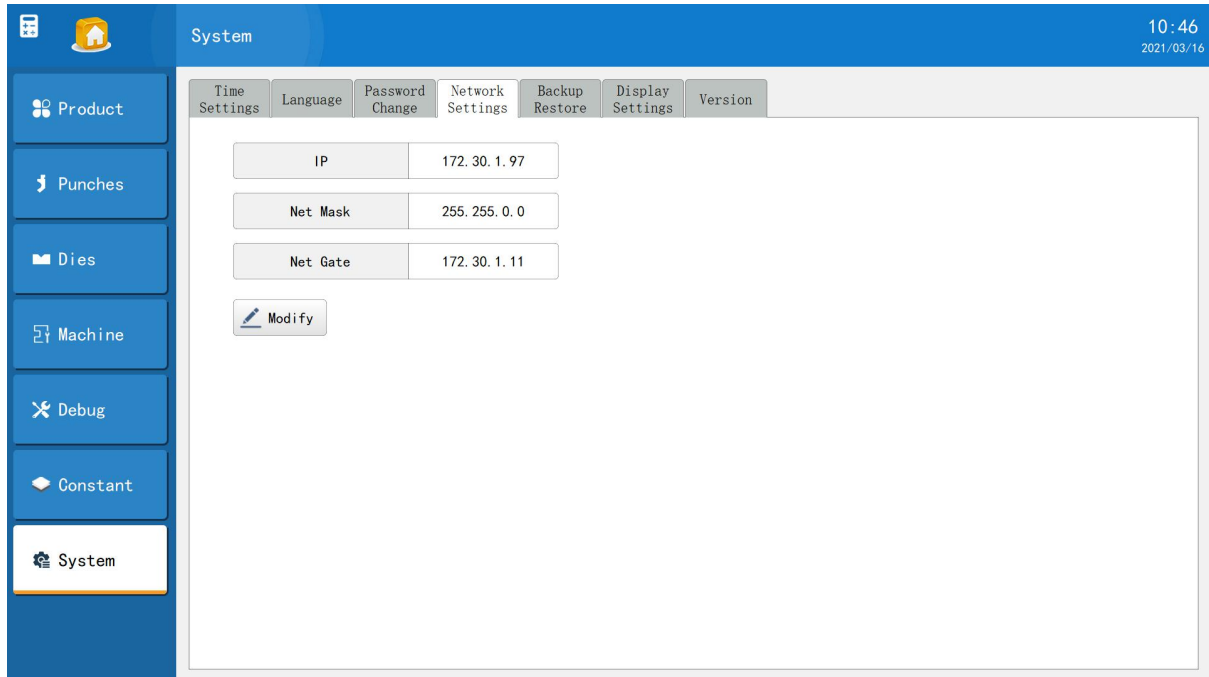


The screenshot shows the 'System' configuration page of a CNC system. The interface has a blue header with the title 'System' and a timestamp '10:45 2021/03/16'. A left sidebar contains navigation buttons for 'Product', 'Punches', 'Dies', 'Machine', 'Debug', 'Constant', and 'System'. The main content area has a tabbed interface with 'Password Change' selected. Below the tabs are three input fields labeled 'Original Password', 'New Password', and 'Confirm Password', followed by a 'Save' button.

8.3-1 Password change

## 8.4 Network Settings

The product has network function. Click the function key of "Network Settings" to configure the IP address, subnet mask and gateway information of the device. As shown in Figure 8.4-1.

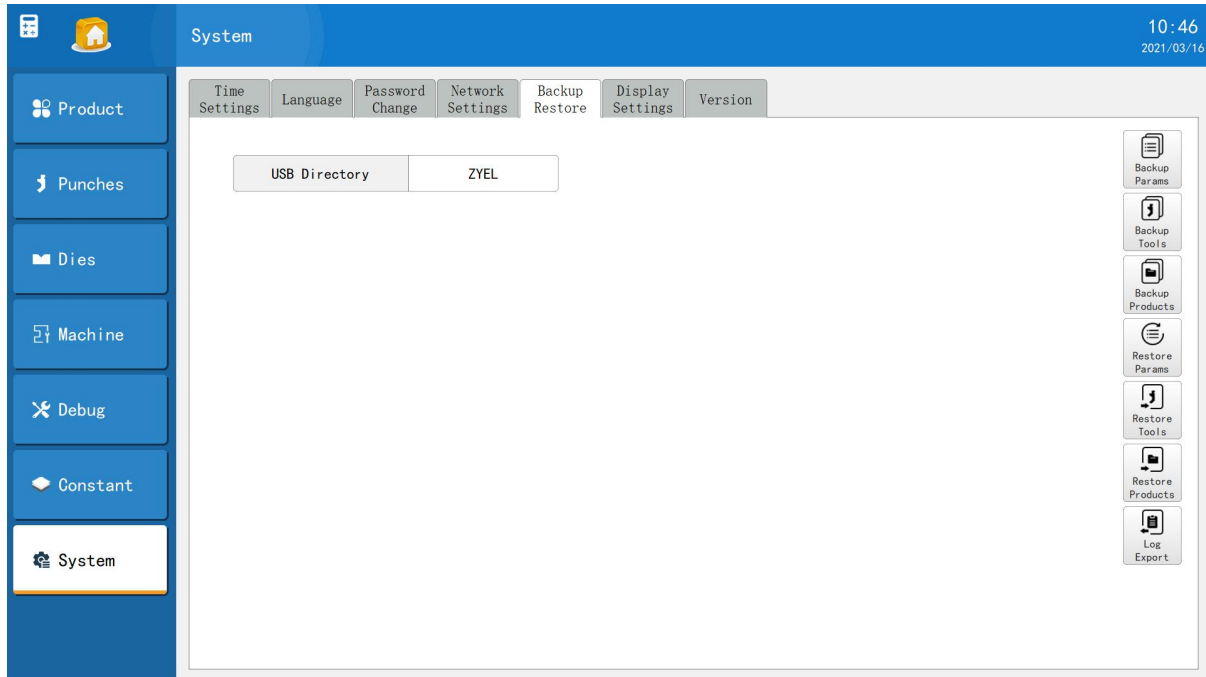


8.4-1 Network Settings

## 8.5 Backup recovery

### The backup

Click the backup and restore function key in the main menu to enter the system backup and restore interface. This is shown in Figure 8.5-1.

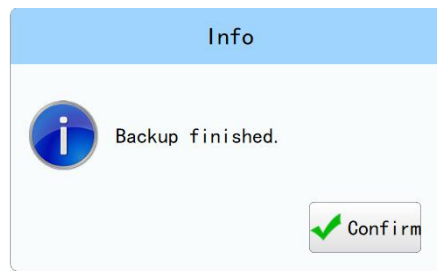


8.5-1 Backup recovery

The backup directory input box in the middle of the page is the name of the backup folder, you can specify the location of the backup file exported on the U disk. If the directory does not exist, it is automatically created at backup time. The directory can use the default directory ZYEL, or it can specify its own directory, such as 15T.

The backup function is divided into three independent backup modules: parameter backup (system constants and internal parameters), mold backup (including material, upper mold, lower mold, file) and product backup, all of which will generate an encrypted backup record under the corresponding backup path. A backup is a full backup of the records of the current system database.

Backup will display a progress bar. If the progress bar is full, the backup is complete. This is shown in Figure 8.5-2.



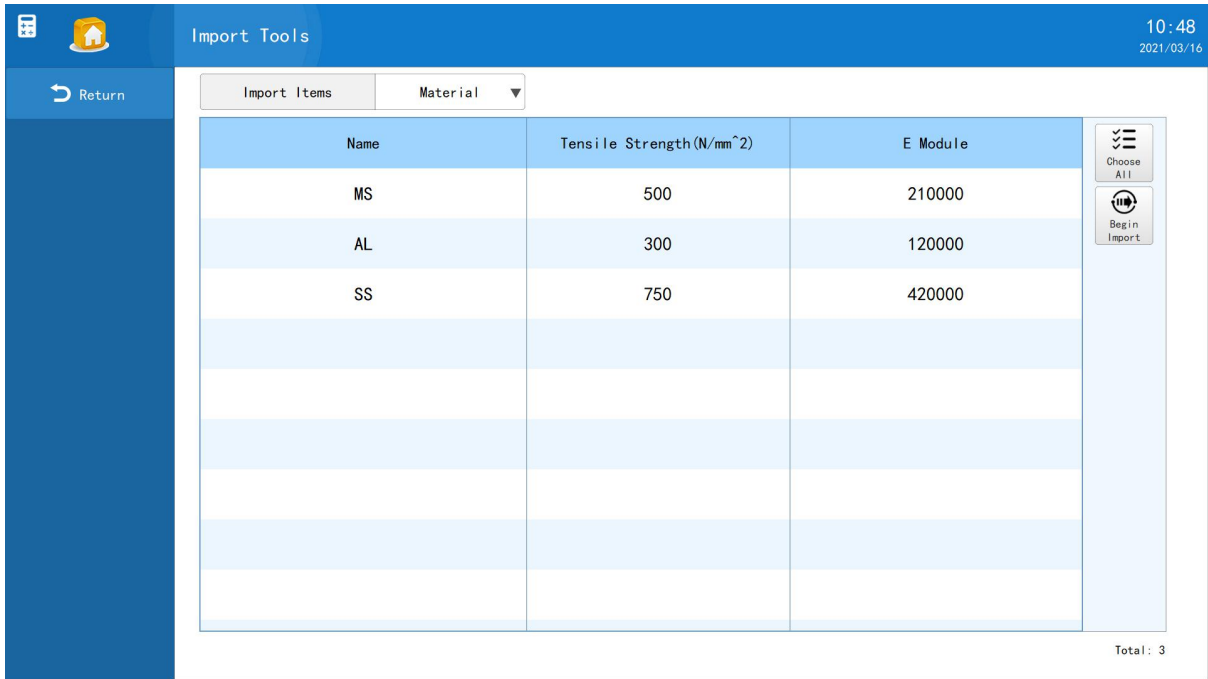
8.5-2 The backup to complete

## Restore

The recovery function is divided into: parameter recovery (recovery of system constants and internal parameters), import mold (optional import material, upper mold, lower mold, file) and import products, the implementation of the recovery function is to restore the contents of the backup file to the current database of the system.

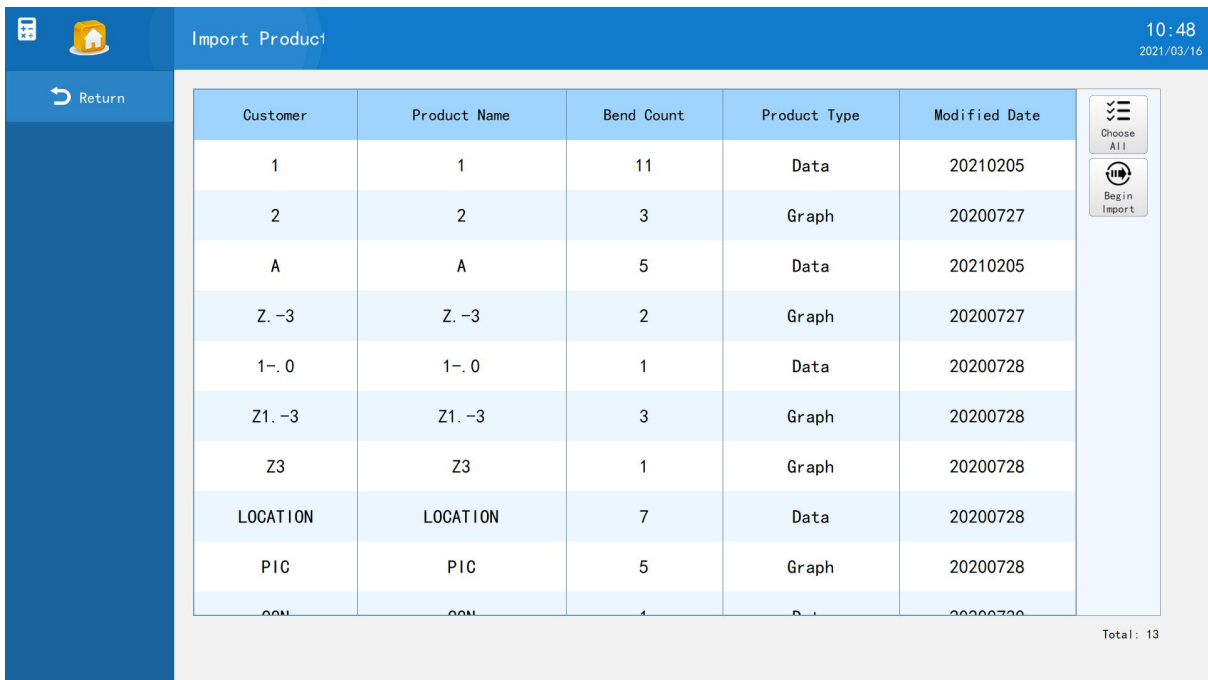
Recovery parameter: After parameter recovery is performed, it can only take effect after restart, and the system will prompt.

Import mold: Click "Import mold" in the backup and recovery interface to enter the mold and material import interface. In "Recovery Options", you can select the import type, such as material, upper die, lower die, and stopper, as shown in Figure 8.5-3. Once the recovery options are determined, the user can choose which items to import or choose to import them all.



### 8.5-3 Recovery options

Import product: Click "Import product" on the backup and recovery interface to enter the product import interface, as shown in Figure 8.5-4. Users can select which items to import or select all of them.

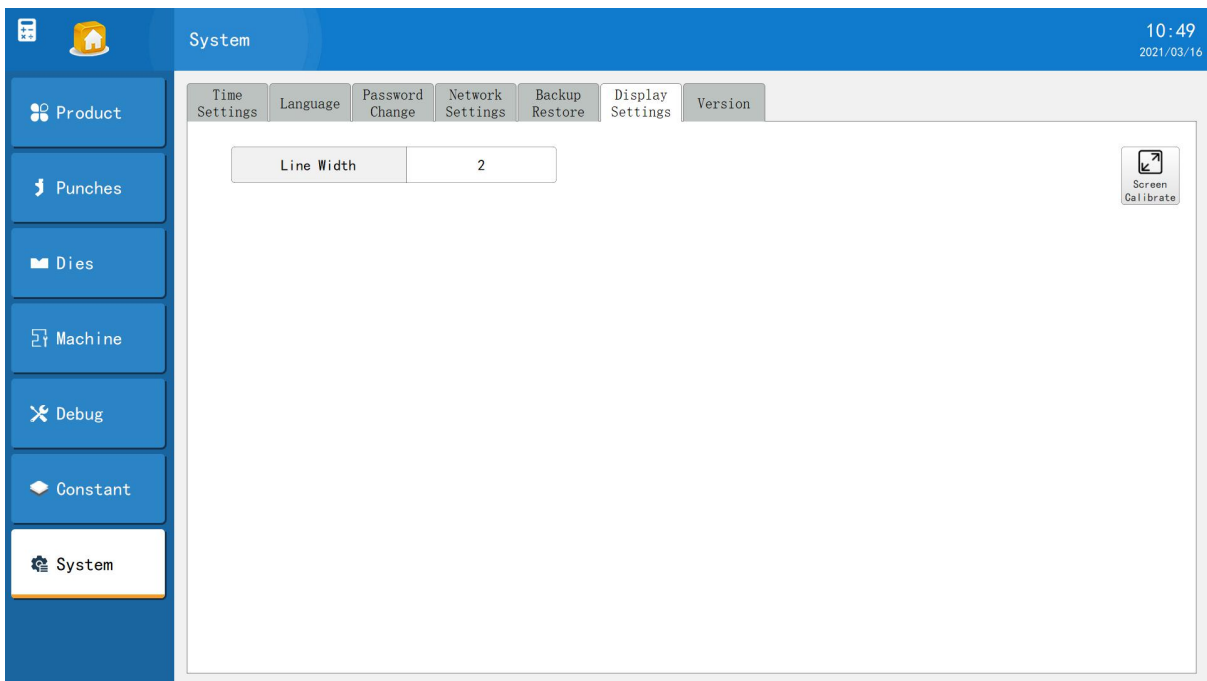


### 8.5-4 Import products

Click Execute Import. If the selected item already exists in the product library, it will prompt "Overwrite or not" and select "Yes" to start the import. When the progress bar is 100%, the import is completed.

## 8.6 Display Settings

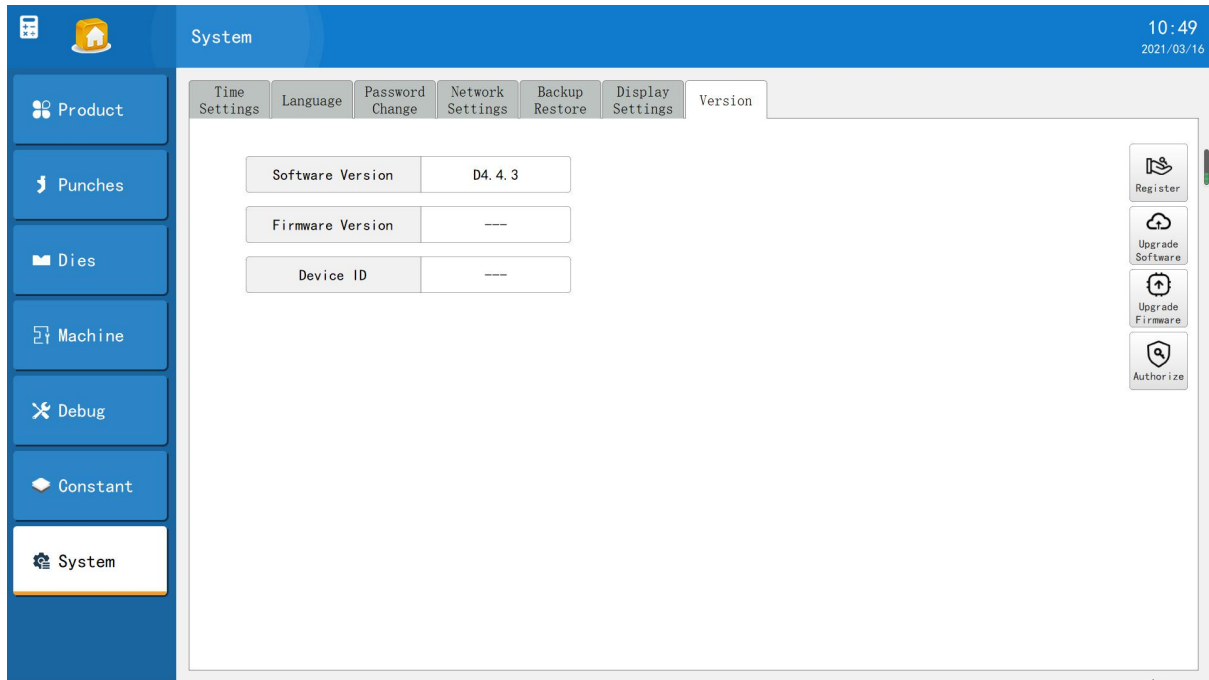
Touch screen calibration: click the display points on the screen one by one to complete the screen calibration function of the device.



8.6-1 Display Settings

## 8.7 Version

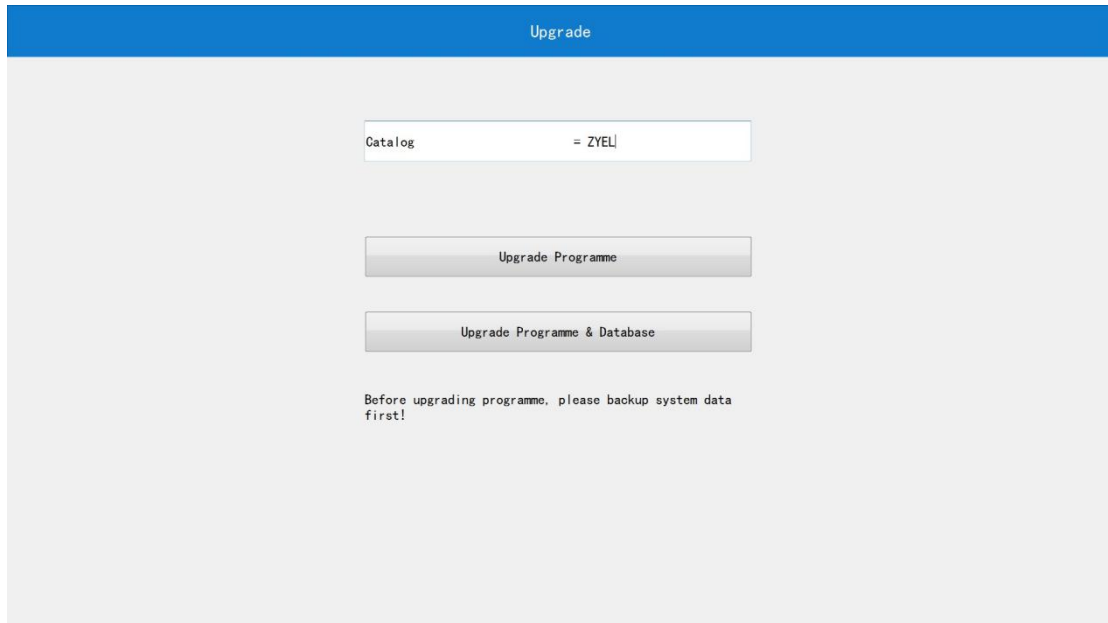
In this page, the user can view the current software version, controller version and device number.



8.7-1 Software version

## Software upgrade

When the software has a major update, such as system optimization, function increase, the user can use the software upgrade function inside the system to achieve the control system upgrade. This is shown in Figure 8.7-2.



### 8.7.2 Software upgrade

The software upgrade steps are as follows:

- The new MT15 program (name of zyel) and database (called zyel. Db), copy to the U disk name for zyel folder.
- Put the U disk inserted into the USB interface control system.
- Enter the "Backup and Restore" functional interface, click the "Software Upgrade" button, enter the software upgrade interface, click "Upgrade Program" or "Upgrade Program & Database", and wait for the upgrade to complete.
- When the software upgrade is completed, please restart the control system and check whether the version number is correct in the "Version" menu of the main interface. If it is correct, the upgrade is completed.