

**CNC metal profile rolling and bending machine (4
servos)**

MGW-CNC-15T

operation instructions

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Preface

Thank you for using the equipment produced by our company. Before using this equipment, please make sure to take the time to read this manual in order to keep your equipment in optimal operating condition and achieve the best economic benefits.

We sincerely hope that during the use of this device, you can promptly provide us with any problems and good suggestions you have found, so that we can cooperate better in our future work.

Thank you!

Our company reserves the right to make technical improvements. Any changes are subject to no further notice. If any discrepancies are found between this manual and the actual product, please refer to the actual product.

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1、Main uses of application:

Mainly designed for the bending and arc processing of broken bridge aluminum profiles, aluminum-plastic profiles, various irregular aluminum profiles, rectangular steel pipes, etc. It can bend various shapes (C-shaped, U-shaped, O-shaped, 3R combination shape, etc.) and is an ideal processing equipment for decoration enterprises and aluminum door and window curtain wall enterprises in the bending and arc process.

2、Equipment working principle and mechanical structure

2.1、Equipment working principle

The equipment is suitable for bending metal profiles with different cross-sections and materials. It has 3 sets of servo driven wheels, 2 sets of servo driven lifting wheels, and 1 set of servo driven spindle feed mechanism; The equipment adopts photoelectric positioning. By using a wheel wheel that matches the cross-section of the profile and utilizing the principle of three-point rounding, the displacement of the middle wheel (pressure wheel) (Y-axis direction) is automatically controlled, allowing the profile to be bent or formed multiple times (X-axis direction) between three sets of wheels to the desired half diameter; The length of feed is collected by an encoder, and the rotation of the wheel is controlled by a CNC control system, which automatically matches the linear speed of the wheel; At the same time, the displacement of the wheel and the feed rate of the intermediate pressure wheel are controlled by a full closed-loop system to achieve high thrust and precision requirements.

2.2、Equipment mechanical structure

2.2.1、Axis seat slide:

2.2.2 Steel plate quenching and tempering treatment, dovetail groove structure connection, each surface is processed by grinding machine, after combination, both the upper and lower surfaces are processed by grinding machines, and the surface is electroplated with hard chromium.

2.2.3 This structure has high strength, good structural stability, a thickness of 180mm, and can withstand particularly large tensile forces.

2.2.4 Minimum bendable inner arc radius 60mm

2.3、X-axis rotating transmission mechanism:

2.3.1 Drive the planetary speed reducer through a CNC servo motor, which drives the mold spindle to rotate

2.3.2 This structure ensures consistent linear speed of the wheel mold by adjusting the speed ratio

2.3.3 It has a large driving torque and is suitable for bending large cross-section profiles.

2.4、Y-axis propulsion mechanism:

2.4.1 Structure: The linear speed reducer is driven by a servo motor, and the linear speed reducer drives the feed of the middle spindle to achieve precise positioning of the middle spindle.

2.4.2 Advantages: High positioning accuracy, ensuring high positioning accuracy when the spindle moves forward and backward, with a repeated positioning accuracy of $\leq 0.01\text{mm}$, suitable for difficult variable curvature arc machining.

2.5、The operation screen can slide and rotate left and right, making it convenient to observe the process of feeding and discharging while operating.

2.6、The machine has a beautiful appearance, and the surface of the frame and protective plate is pickled, phosphate, and electrostatically sprayed.

2.7、All three axes are active and equipped with anti-tilt devices

2.8、The electrical system is manufactured according to export European standards, with high safety.

3、 Main component configuration of the equipment

Serial No.	Accessory name	Origin and brand	quantity	Note
1	Axis Sliding track	Self-produced	1set	heat treatment processing, grinding machine processing, surface electroplating of hard chromium
2	main shaft	Self-produced	3sets	Material 40Cr, quenched and tempered, surface high-frequency quenching, grinding machine precision machining
3	Spindle rotation bearing	Swedish SKF	6sets	
4	Motion Contwheel	China “googol”	1set	

5	IPC	Industrial Computer Taiwan "Advantech"	1set	I7Cpu
6	21.5" PC screen	China	1nos	Dual use touch/mouse, vertical screen
7	Servo motor driver/servo motor	China	High inertia and high torque 3 units * 1.8KW	Installation location: Used for spindle rotation
8	Servo motor driver/servo motor	China	High inertia and high torque 1 unit * 4.4KW	Installation location: Used for spindle feed
9	planetary reducer	China	3sets	Installation location: Used for spindle rotation
10	planetary reducer	China	1set	Installation location: Used for spindle feed
11	Linear reducer	China	1set	Installation location: Used for spindle feed
12	Photoelectric detection switch	China	1set	Used for locating the end of the workpiece
13	Displacement encoder	China "TEP"	1set	Used for measuring the length of workpieces
14	Grating ruler	China "sino"	1set	Used for Y-axis feed positioning
15	Positioning detection switch	Schneider, France	7sets	Used for Y-axis and Z-axis positioning
16	Air Switch	Schneider, France	9sets	Used for controlling motors
17	Power supply	Taiwan "MW"	1set	Power the detection switch

4、Technical Parameter

1、Power: 7.5KW

2、Voltage: 380V 50HZ

3、wheel speed: 0-15R/min

4、Max. Wheel diameter: 240mm

5、Wheel axis diameter: 50mm

6、Fixed axis center distance: 280~600mm

7、Y-axis rated thrust: 13Ton

8、Minimum machining radius: 100mm

9、Maximum cross-section of bending profiles: maximum width 120mm, maximum axial height 200mm

Note: The width and height cannot reach the maximum value at the same time.

10、Y-axis positioning accuracy: 0.01mm

11、Overall size: 1500mm*1200mm*1400mm

12、 Weight: 900kg

5, Installation

1、Conditions:

The machine should be installed on a dry, dust-free, non corrosive gas, and indoor hard cement floor with a temperature of 15-35 degrees Celsius.

2、levelling:

Adjust the guide rail to the horizontal position by adjusting the adjusting bolts on the lower base of the machine body. The specific requirement is that the horizontal error of the three wheel table height should be less than 0.5mm, and the frame leveling nut should be locked after leveling.

3. Screen installation, as shown in the following figure:



3、Grounding:

The grounding wire must be grounded according to the requirements (as shown in the figure below), with a specification of soft copper wire with a cross-sectional area greater than 2.5mm^2 and a grounding resistance not exceeding 4 ohms.



4、Power on:

Equipment input voltage: 380V 50HZ, externally connected to a soft copper wire with a cross-sectional area greater than 2.5mm^2 (three-phase four wire).



6、Usage and operation

1、Power on and start up

After confirming the correct system connection, turn on the main power switch, as shown in the following figure:



Press the "System Start" button and wait for about 10 seconds before a desktop icon appears on the screen:



2、 Open the CNC system



On the screen icon interface, select the icon “BenderCNC”, On the screen icon interface, select the icon and double-click the left mouse button (or double-click the icon with your finger) to bring up the administrator entrance interface: (See

the following figure)



In the administrator entrance interface, enter the administrator password "123" to enter the recipe editing interface, as shown below:



3、MANUAL



click “Manual” button, The system will display a manual operation interface, as shown in the following figure:



The following are functional annotations for the “Manual Operation” interface:




3.1、Press “Home All” button, wait about 10 seconds, Can return the middle wheel to the zero position; At this point, the yellow text above the screen


UNORG will turn to green ready Ready, The

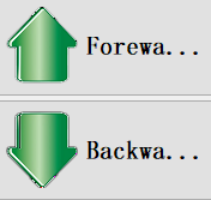
machine tool has returned to zero normally.

Attention: Before each startup and use, you must first enter the manual operation interface

and press the “ Home All” Press the button to return the Y-axis to the zero position ()

3.2、Press “ Home Stop” button, Can stop the Y-axis return zero position process;

3.3、 Press “ Y Home”, Can return Y-axis to zero position.

3.4、 press “ Forewa... Backwa...” Arrow, Can move the middle wheel forward or backward;

3.5、 The Y-axis front and rear limit indicator lights, if the displayed color changes from green to red, indicate that the Y-axis has reached its limit position.

3.6、 The speed of Y-axis forward and backward movement

3.7、 Relative position of Y-axis movement (stacked relative to the current position)



Enter the Y position to move the number, press the “Confirm” button to move the middle wheel to a relative position.

3.8、 Absolute position of Y-axis movement (relative to zero position)

Enter the Y position to move to the number, press the “confirm” button to move the middle wheel to the absolute position

3.9、 Display the current position of the Y-axis

3.10、X axis Clear the current position display value to zero

3.11、press “ ” arrow, Can move the workpiece to the left or right;

3.12、X-axis speed setting

3.13、Relative position of X-axis movement (stacked relative to the current position of X)

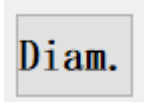
Enter the X position movement data and press the “Confirm” button to move the middle wheel to a relative position

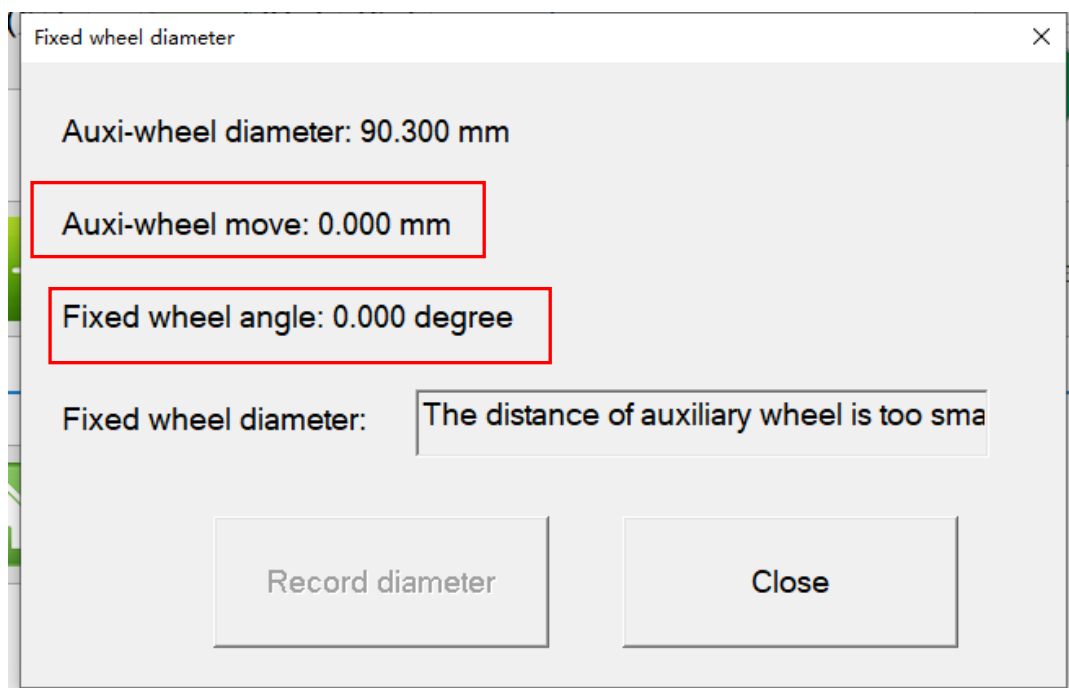
3.14、Absolute position of X-axis movement (relative to zero position)

Enter the X position data, press the “confirm” button to move the middle wheel to the absolute position

3.15、Spindle rotation angle in X direction


3.16、Display of workpiece movement distance in the X direction

3.17、Press “”, Can display the diameters of the wheels on both sides auxiliary wheels, as shown in the following figure:



Attention to the calculation of fixed wheel diameter:

Before measuring and calculating the diameter of the fixed wheel, please perform

a zeroing operation on the X-axis .

If not reset to zero, the displacement of the auxiliary wheel does not match the angle of the fixed wheel, which will result in calculation errors.

4、Formula editing (non-standard arc)

There are three methods for editing the arc formula of the workpiece that needs to be processed, as follows:

4.1 Formula Editing Method 1: (Manually editing formulas)

4.2 Formula Editing Method 2: (DXF File import 2D drawing editing formulas)

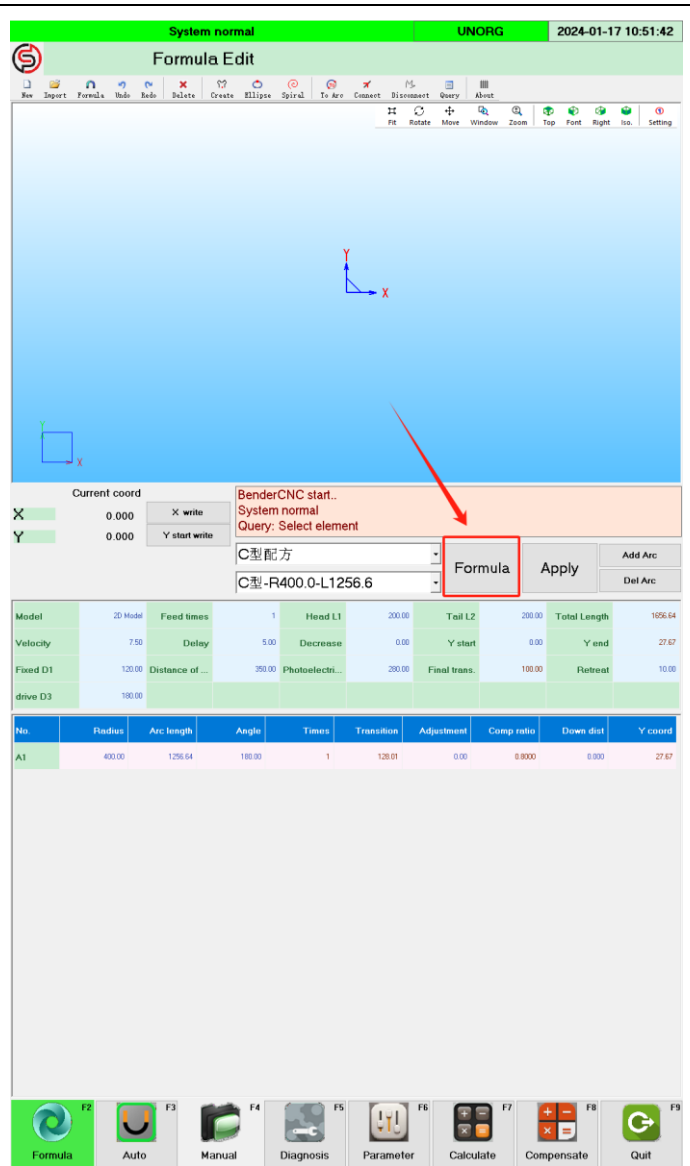
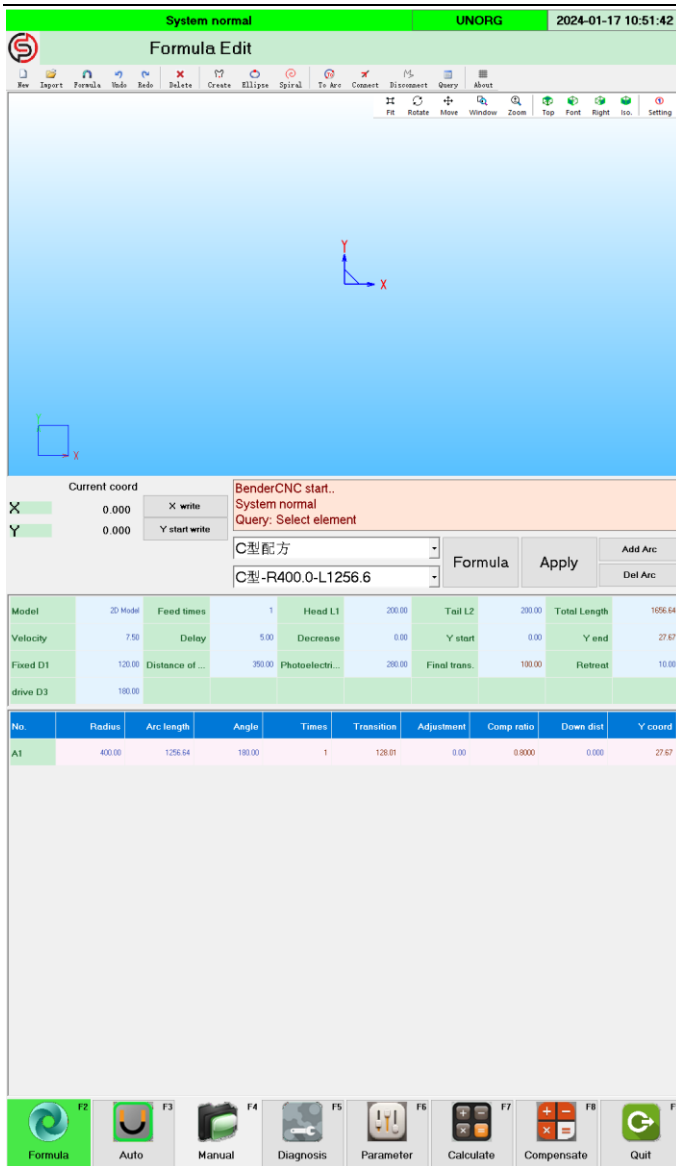
4.3 Formula Editing Method 3: (STEP/IGS Import 3D models editing formulas)

Below, we will introduce the formulas editing methods one by one

4.1 Formula Editing Method 1: (Manually editing formulas)

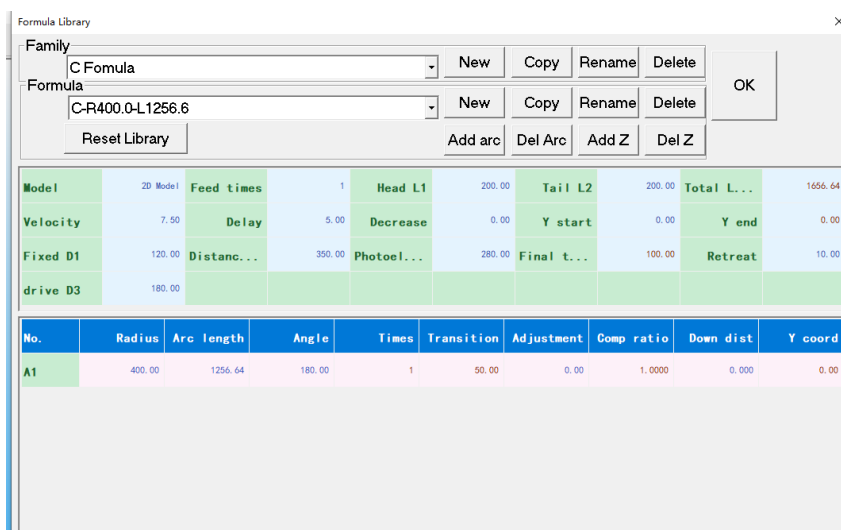


Press “

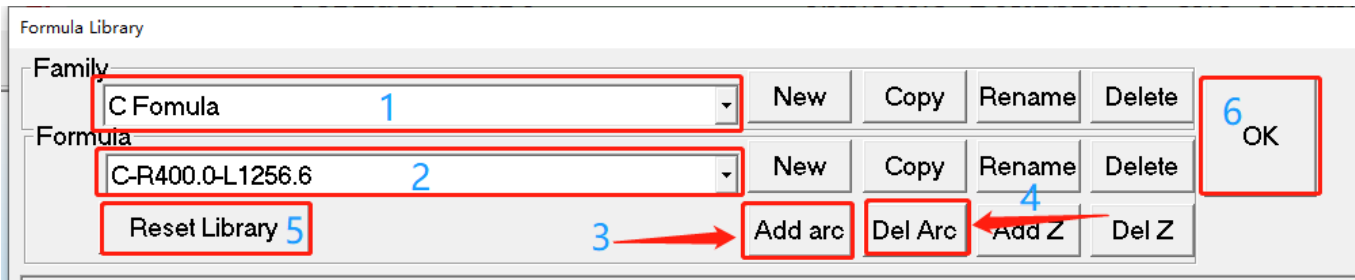


Formula

click “ ” button, enter formula menu, as below:



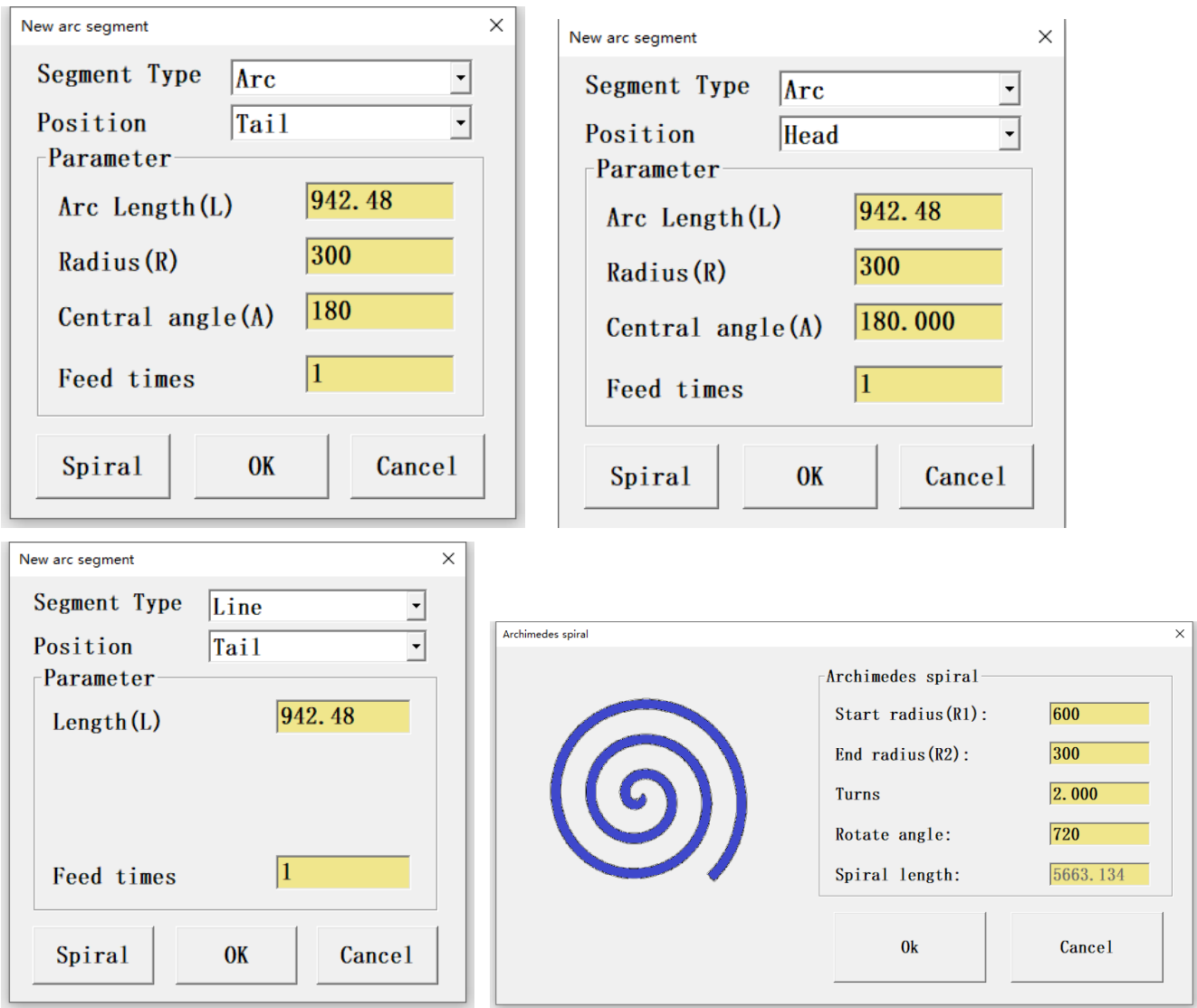
Perform the following operations on this interface:



1—Enter new family name, it shows family name; Or choose the existing family name

2—Enter New formula name, Create New formula name or using existing formula name


3—Adding an arc, click “Add arc”, it shows below:




Select the type of segment required above (one of which) to add: arc segment, line segment, or spiral line;

Select position to add: Head、2nd section、3rd section、……Tail;

Enter the length (or central angle) of the arc, the radius of the arc, the length of the line segment, the number of feedings, and after each arc is entered, click "OK" to automatically import the data into the profile formula.

4—Delete arc, select the arc in the formula that needs to be deleted, and click “” then it will be deleted.


5—reset formula library, click “”, It is possible to modify the mold parameters and machine tool parameters shared in the formula (usually set before leaving the factory). If the mold needs to be replaced or the axis spacing needs to be re-adjusted, this parameter needs to be modified. After modification, click "OK" to save, as shown in the following figure:

Reset Parameter

Property	Value
Reset device parameter	
Fixed D1	120.000
drive D3	180.000
Distance of fixed wheel	350.000
Photoelectric dist	280.000
Head L1	200.000
Tail L2	200.000

OK

Cancel



赛谱数控

SAIPU-CNC

The automatically generated arc formula is shown in the following figure (example)

Formula Library

Family

U型配方

New

Copy

Rename

Delete

OK

Formula

SP-12345

New

Copy

Rename

Delete

Reset Library

Add arc

Del Arc

Add Z

Del Z

Model	2D Model	Feed times	1	Head L1	200.00	Tail L2	200.00	Total Length	1856.64
Velocity	7.50	Delay	5.00	Decrease	0.00	Y start	0.00	Y end	27.67
Fixed D1	120.00	Distance of...	350.00	Photoelectr...	280.00	Final trans.	100.00	Retreat	10.00
drive D3	180.00								

No.	Radius	Arc length	Angle	Times	Transition	Adjustment	Comp ratio	Down dist	Y coord
A1	400.00	628.32	90.00	1	128.01	0.00	0.8000	0.000	27.67
L2	Line	200.00	---	1	155.68	0.00	1.0000	0.000	0.00
A3	400.00	628.32	90.00	1	128.01	0.00	0.8000	0.000	27.67

OK

6—click “

OK

” button, To return to the “formula Editing” interface, the

following parameters need to be modified:

System normalUNORG2024-01-17 10:59:17

Formula Edit

NewImportFormulaUndoRedoDeleteCreateEllipseSpiralTo ArcConnectDisconnectQueryAbout

FitRotateMoveWindowZoomTopFontRightIsoSetting

Current coord

X0.000X write

Y0.000Y start write

BenderCNC start..

System normal

Query: Select element

U型配方

SP-12345

Formula

Apply

Add Arc

Del Arc

Model	2D Model	1Feed times	1	2Head L1	200.00	3Tail L2	200.00	Total Length	1856.64
Velocity	7.50	Delay	5.00	5Increase	0.00	6Y start	0.00	Y end	27.67
Fixed D1	120.00	Distance of ...	350.00	Photoelectri...	280.00	Final trans.	100.00	Retreat	10.00
drive D3	180.00								

No.	Radius	Arc length	Angle	Times	Transition	Adjustment	Comp ratio	Down dist	Y coord
A1	400.00	628.32	90.00	1	128.01	0.00	0.8000	0.000	27.67
L2	Line	200.00	---	1	155.68	0.00	1.0000	0.000	0.00
A3	400.00	628.32	90.00	1	128.01	0.00	0.8000	0.000	27.67

F2Formula

F3Auto

F4Manual

F5Diagnosis

F6Parameter

F7Calculate

F8Compensate

F9Quit

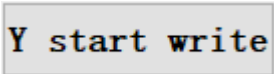
Parameter 1: feed times, system default 1 time bending, it can set bending times as per your requirement; if feed times set 0, then Each arc in the formula can be set with different feed times.

Parameter 2: Head L1, system default formula lab. data, If the reserved straight line segment is relatively long, it can be modified as needed.

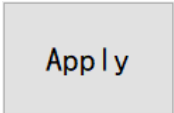
Parameter 3: Tail L2, system default formula lab. data, If the reserved straight line segment is relatively long, it can be modified as needed.

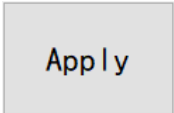
Parameter 4: working velocity, amend as per needs, Maximum less than 15Turns.

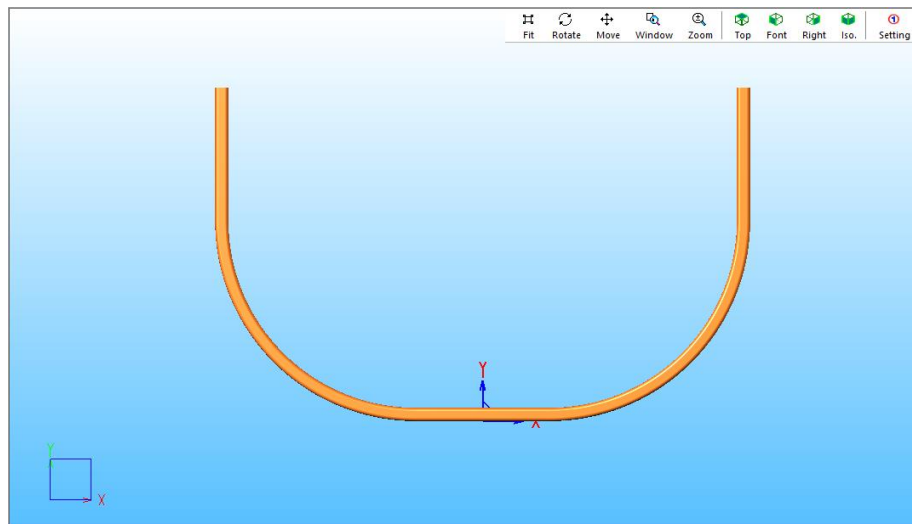
Parameter 5: Arc Decrease, 1 time bending ok, default 0; multi-times bending, set as per needs, usually is not exceeding 40mm

Parameter 6: Y Start position, the start position of bending, put workpiece/profile into the machine, 3 wheels clamp the workpiece, while workpiece is not bended, now Y Axis showing data is Y axis start position, it can be manually inputted, or click “” auto input.

Notes: set other paramteters as per your needs if required.



When setting parameters are done, click “”button, it shows the simulated model of the newly edited formula as follows:



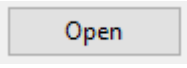
The function buttons in the upper right corner of the simulation model interface can enhance the three-dimensional display of the model. .

4.2 Formula Editing Method 2: (DXF File import 2D drawing editing formulas)

1st, store the files that need to be imported into a USB drive, and insert the USB drive into the USB socket on the machine, In the formula editing interface,

click on the top right corner of the screen “ New” button, Clear other models

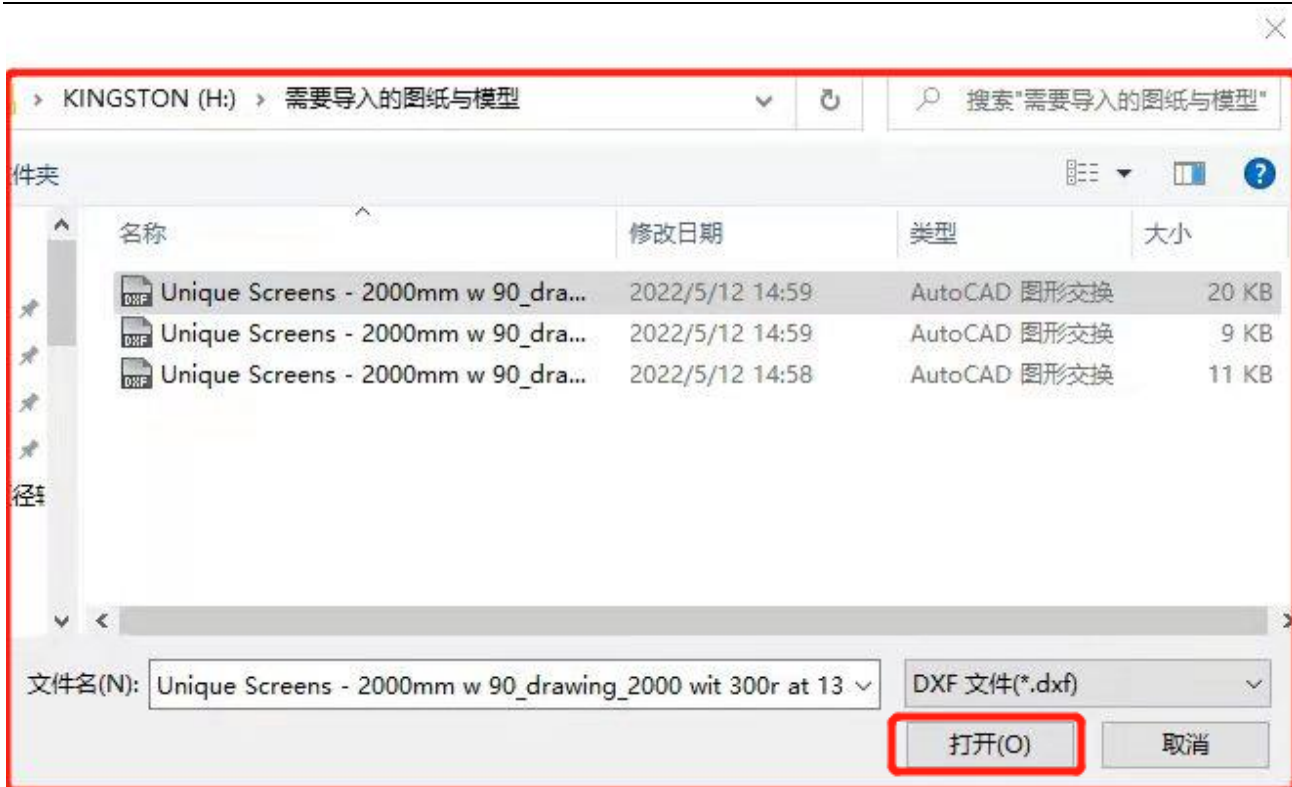
from the model display box, then click “ Import” button, Select the DXF file to

be imported from the USB drive, press “ Open” file, Wait a few seconds, the

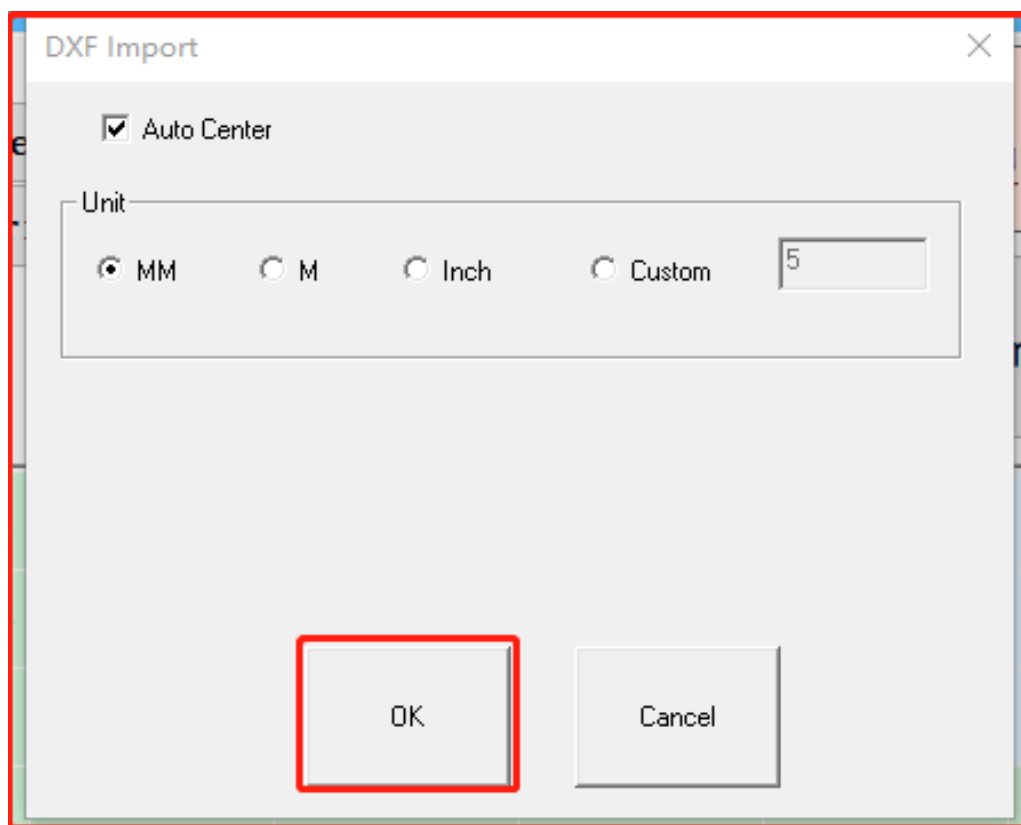
DXF drawing will be displayed in the model display box. Use the mouse to delete unnecessary straight and arc segments, while keeping the arc and line segments that need to be processed (note: do not connect with other unnecessary segments)

Example :

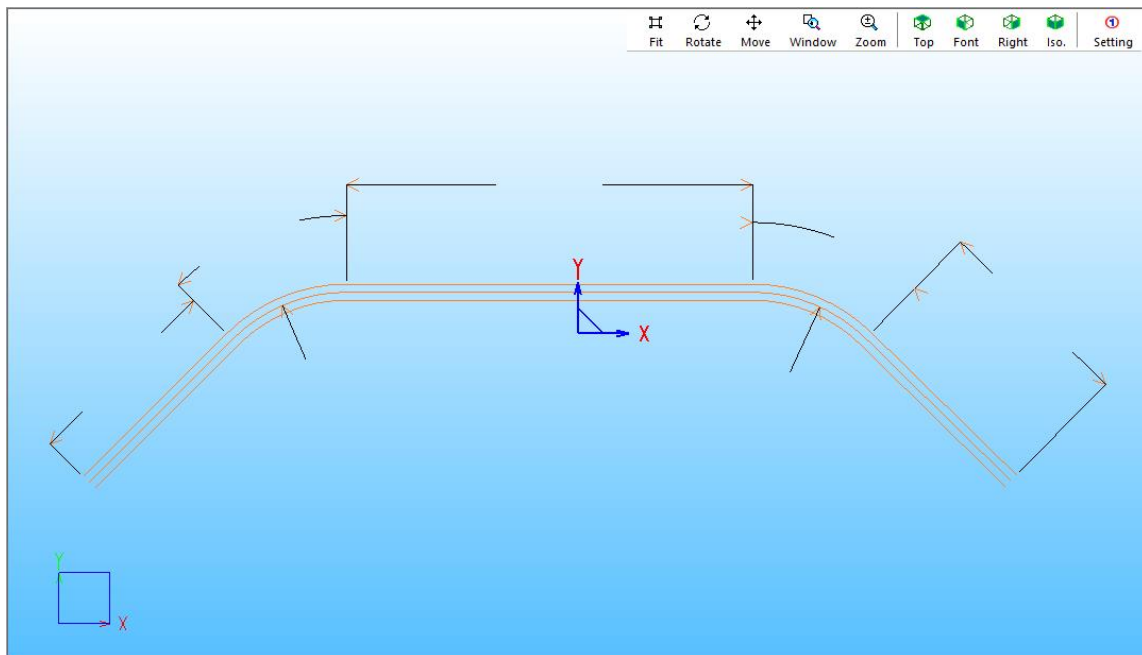
Select the DXF file to be imported, click the “Open” button,



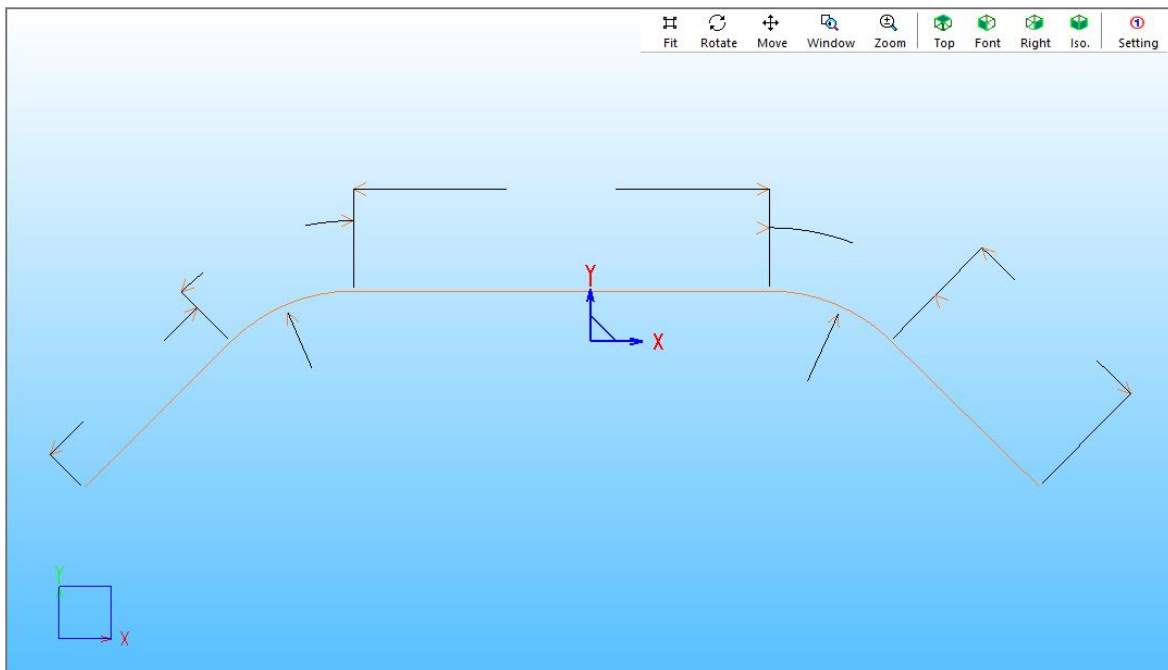
Select the size unit and click the "Confirm" button,



Import drawings into the model display box:



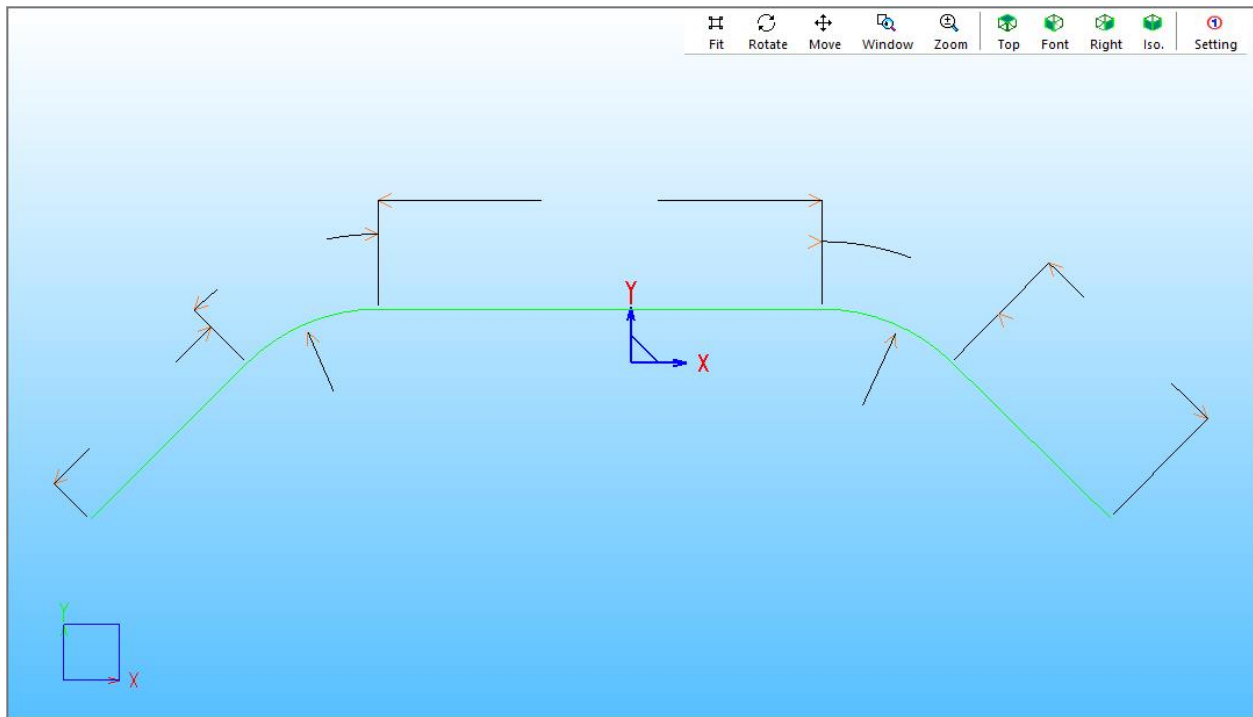
Delete excess arc and line segments with the mouse:



click “ Create” button (Create profile formula),

system indicate: **Formula: Pick trajectories 1, right-click to pick section**

Select the trajectory line, which will turn green after being selected, as shown in the following figure:



Notes :

1. If the trajectory line is not a complete line, but is composed of multiple line segments combined together, you need to click one by one according to the system prompt until all clicks are completed;

2. To avoid multiple clicks on the trajectory line, before creating a formula,



first click “**Connect**” button, Connect multiple line segments into a single trajectory line.

After selecting the trajectory line, right-click to end picking the trajectory line,

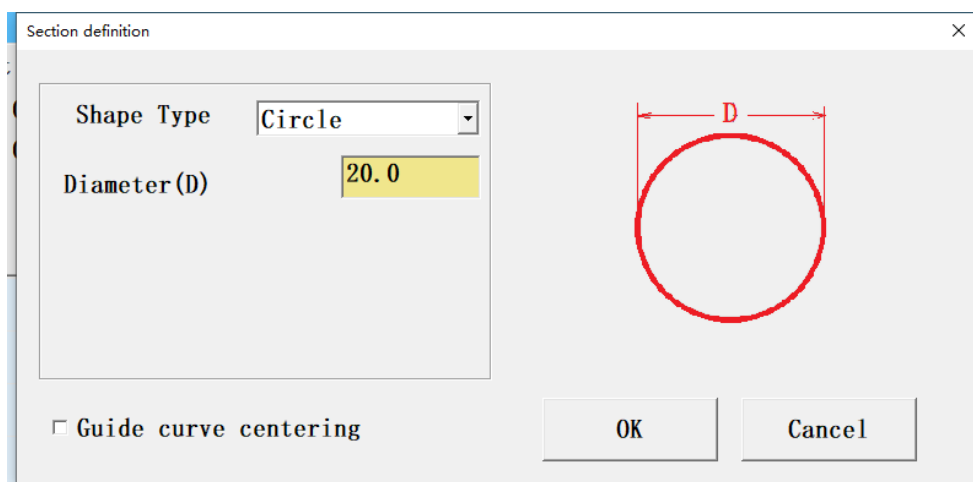
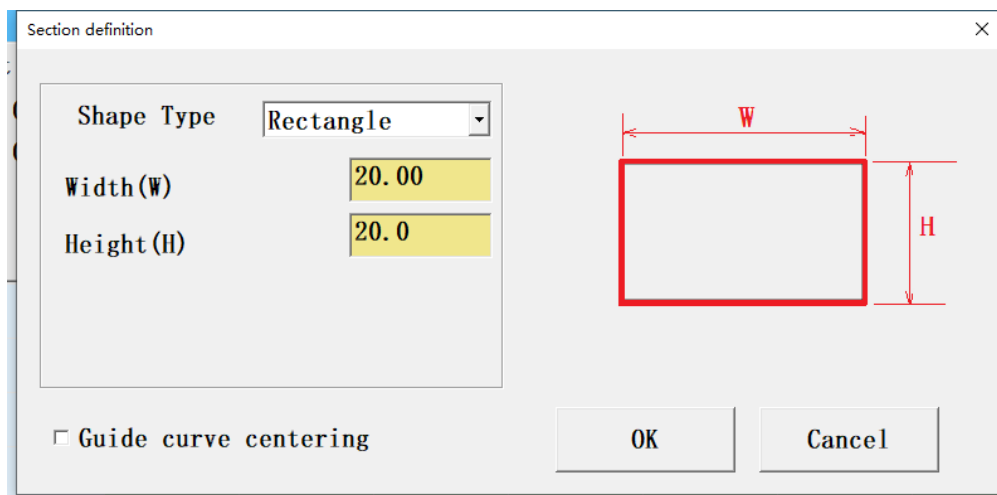
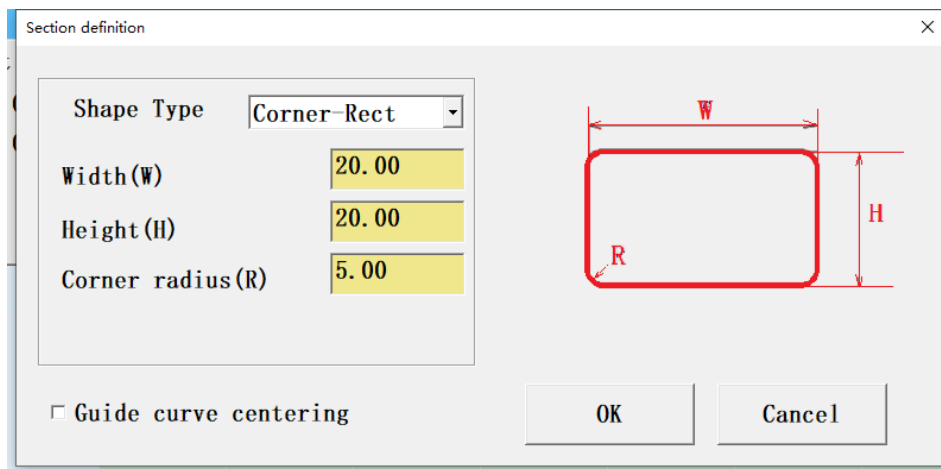
System notify:

Formula: Pick first section curve(or right-click to define shape)

If there is a cross-sectional shape of the workpiece in the DXF file, simply box select the cross-section;

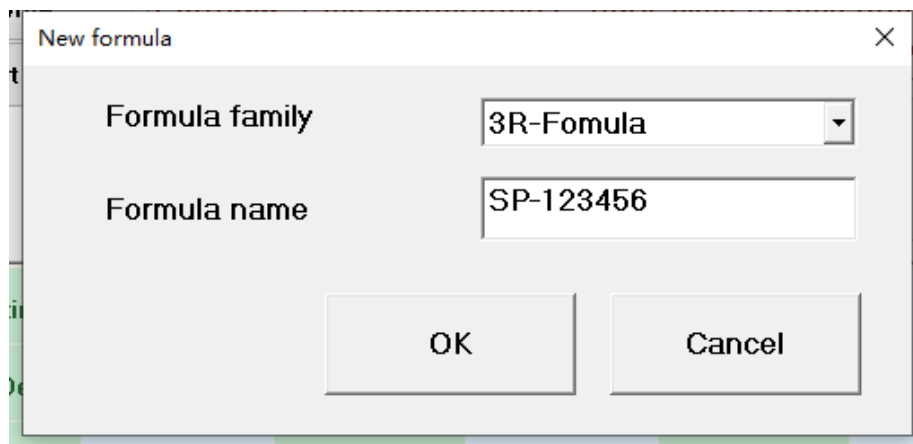
If there is no cross-sectional shape of the workpiece in the DXF file, right-click

again and the system provides three cross-sectional shapes for selection, as shown in the following figure:

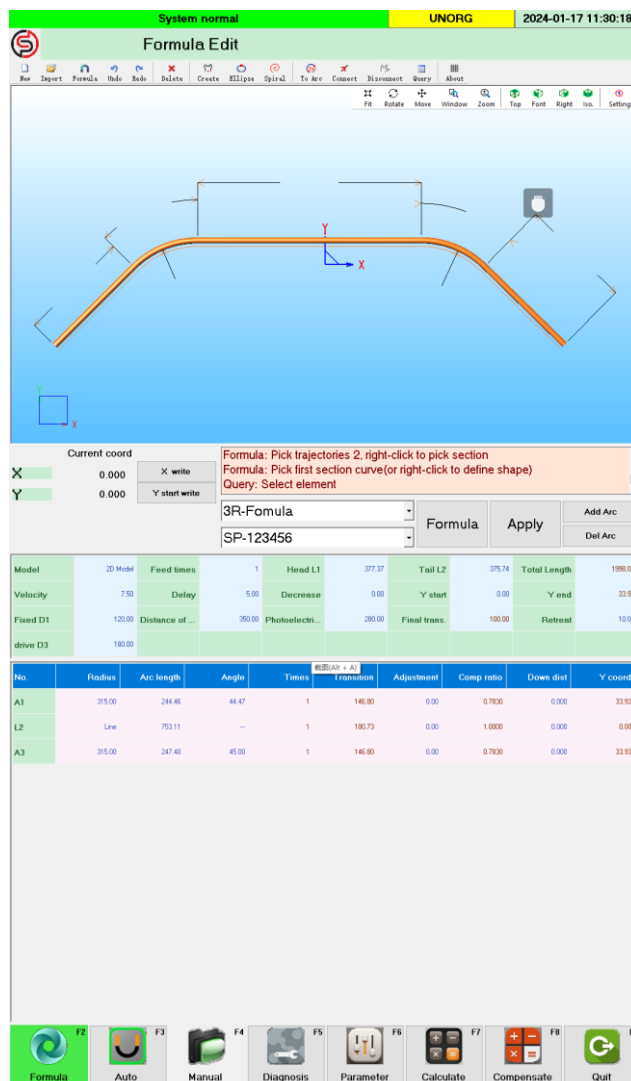



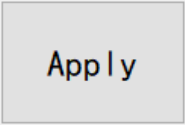
Select one of the cross-sectional shapes, enter a size similar to the workpiece,

click the "OK" button, and the system will pop up the following interface:



Select formula family, enter formula name: ***** , click "OK", Automatically generate arc processing formulas and synchronously generate 3D simulation models, as shown in the following figure:



If the 2D drawing annotation lines within the model display box are not eliminated, you can click on them first “”, clear the models, then click “”, Generate a 3D simulation model again based on the formula content.

The data in the automatically generated formula needs to be modified or inputted, and the specific steps are exactly the same as those in steps 4-1, as shown in the following figure:

Auto generated data:

Current coord

X

0.000

X write

Y

0.000

Y start write

Formula: Pick trajectories 2, right-click to pick section

Formula: Pick first section curve(or right-click to define shape)

Query: Select element

3R-Fomula

SP-123456

Formula

Apply

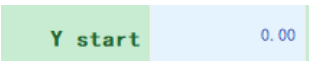

Add Arc

Del Arc

Model	2D Model	Feed times	1	Head L1	377.37	Tail L2	375.74	Total Length	1998.08
Velocity	7.50	Delay	5.00	Decrease	0.00	Y start	0.00	Y end	33.93
Fixed D1	120.00	Distance of ...	350.00	Photoelectri...	280.00	Final trans.	100.00	Retreat	10.00
drive D3	180.00								

No.	Radius	Arc length	Angle	Times	Transition	Adjustment	Comp ratio	Down dist	Y coord
A1	315.00	244.46	44.47	1	146.80	0.00	0.7830	0.000	33.93
L2	Line	753.11	...	1	180.73	0.00	1.0000	0.000	0.00
A3	315.00	247.40	45.00	1	146.80	0.00	0.7830	0.000	33.93

wherein:



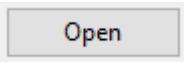

 it must be inputted again, click  auto input the data, Other data can be modified as needed or not modified, and the operation steps are the same as the 3-1 formula editing method 1.

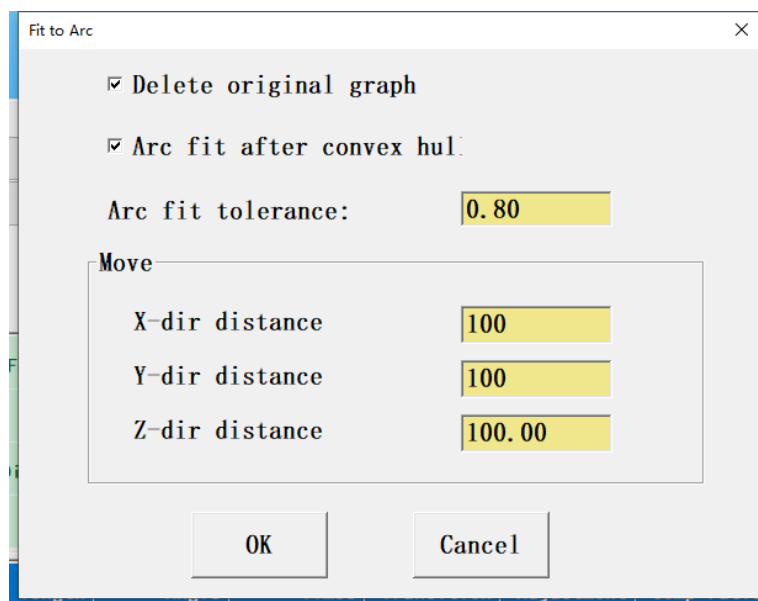
At this point, the profile formula editing is completed.


4.3 formula editing method 3: (STEP/IGS Importing and editing formulas from 3D models)

Store the files that need to be imported into a USB drive and insert the USB drive into the USB socket on the machine,

In the formula editing interface, click on the top right corner of the screen

“ New” button, Clear other models from the model display box, click “ Import” button, Select the STEP/IGS 3D model file to be imported from the USB drive, click “ Open” open files, wait few seconds, STEP/IGS The 3D model file is displayed in the model display box, Select an arc on the model, click “ To Arc” button, system display:

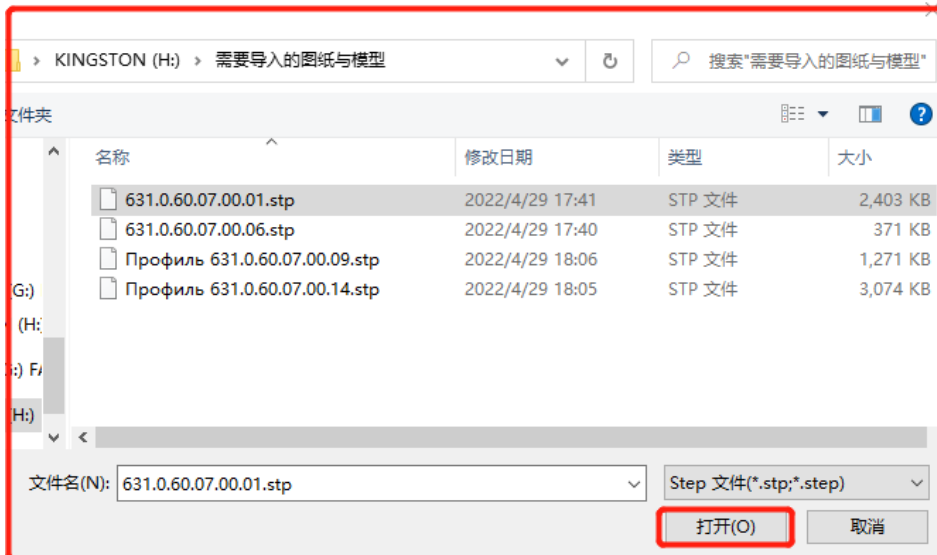


Click the “OK” button, and the model display box will automatically generate a two-dimensional curved trajectory line. Use the mouse to delete all unnecessary trajectory lines, leaving only one standard curved trajectory line, use “ 连接”

button, Transform the trajectory line into a complete curve, and the remaining steps and methods are the same as the 4-2 formula editing method 2.

example:

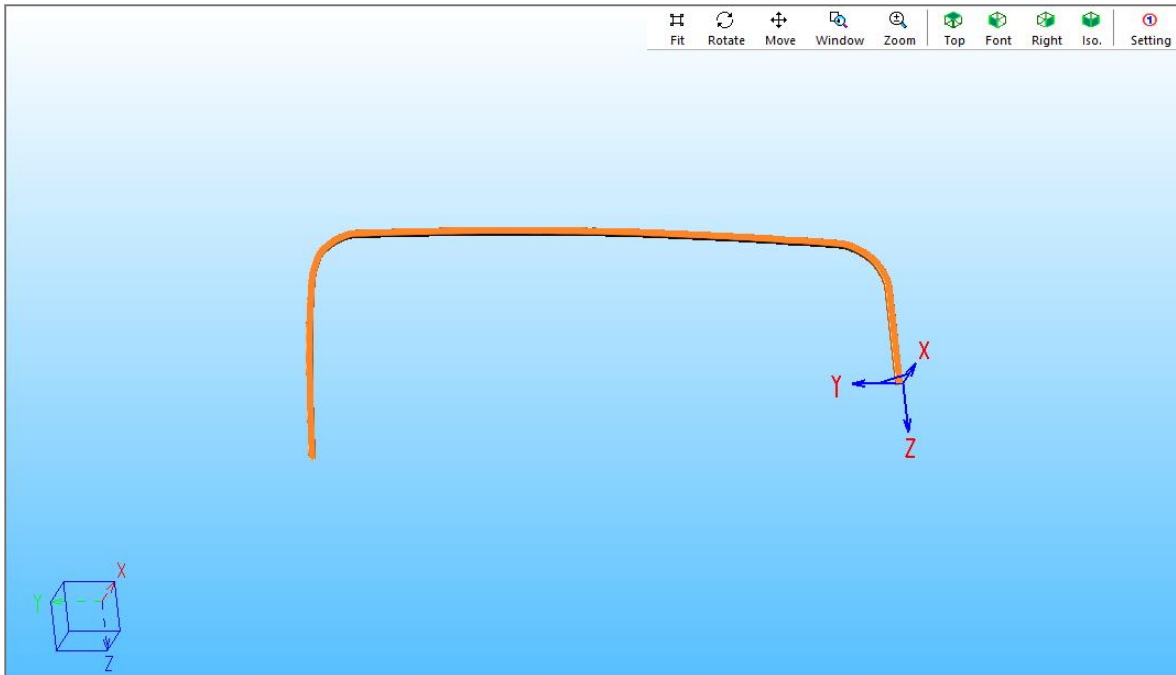
select file of STEP/IGS files, click “open” button,



System display, click “OK” button,



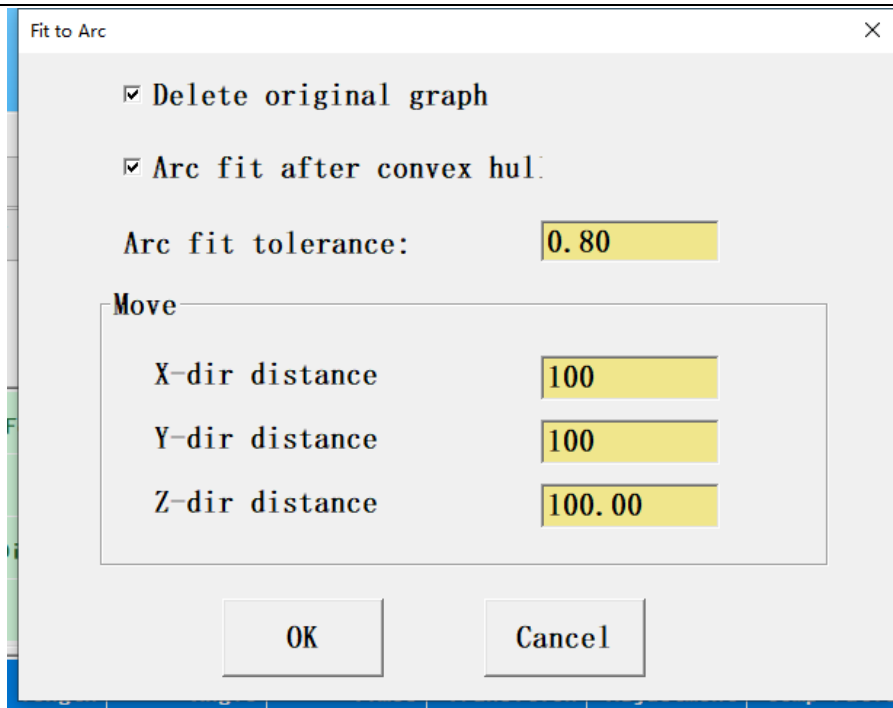
Wait a few seconds, the system will import the 3D model, as shown in the following figure:



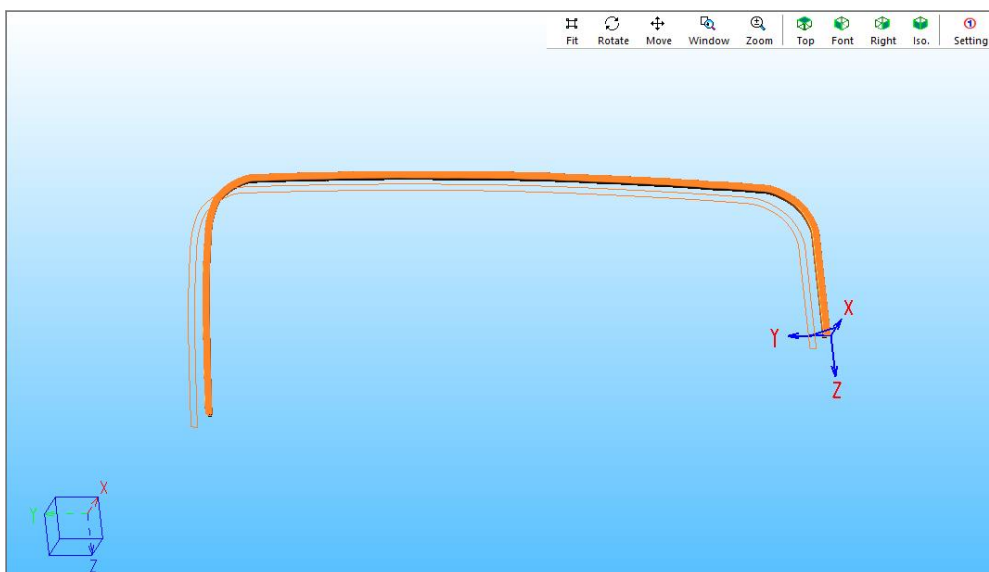
Select an arc on the model , as shown in the following figure: the green part



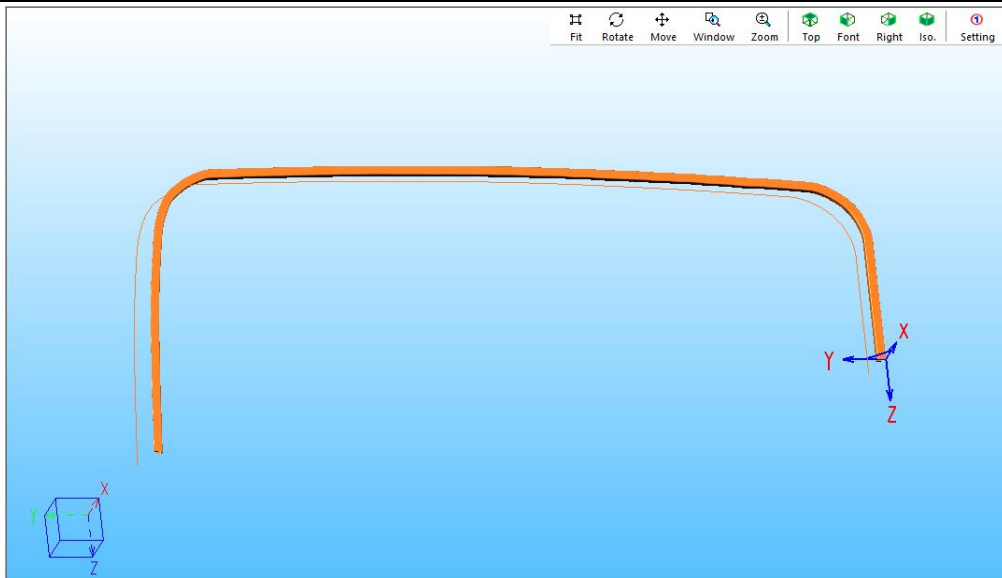
click “  ” button, system display:



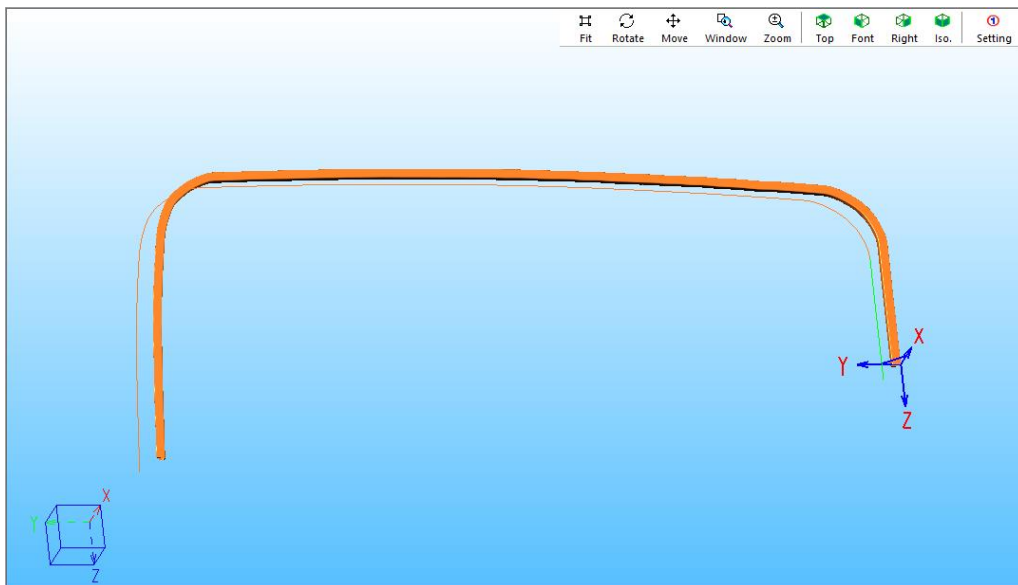
press “ OK ” button , The model display box automatically generates a two-dimensional curved trajectory line, as shown in the following figure:



Using the mouse, delete all unnecessary trajectory lines and leave a standard curved trajectory line, as shown in the following figure:



click “连接” button, Make the trajectory line a continuous arc



click “Create” button (create profile formula),

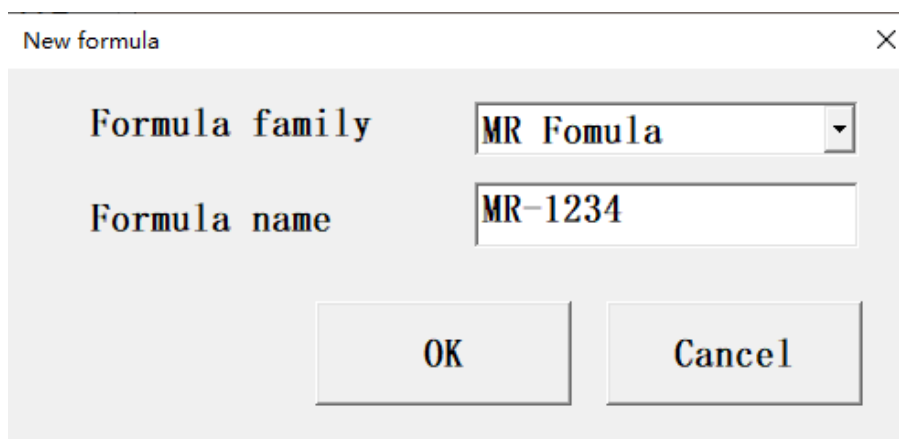
system notify: Formula: Pick trajectories 1, right-click to pick section

Select the trajectory line, which will turn green after selection. Right click the mouse button,

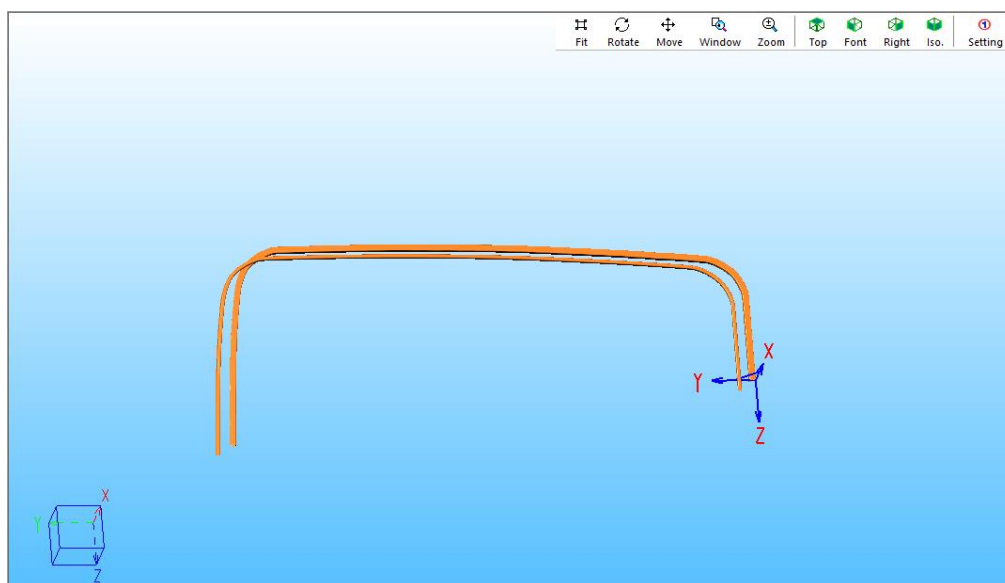
System notify: Formula: Pick first section curve(or right-click to define shape)

After selecting the cross-sectional shape, the system will pop up the following


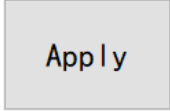
interface:

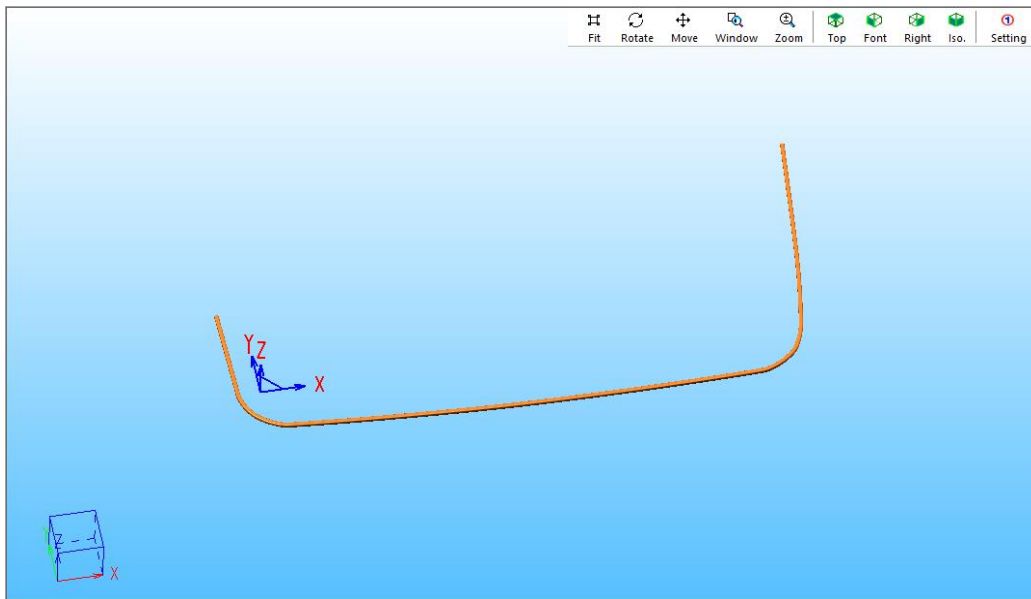


Select the recipe group and enter the recipe name ***** ,click “OK”, automatically generate a curved machining formula and synchronously generate a 3D simulation model, as shown in the following figure:



Due to the duplication of the automatically generated model with the original

model, click “ New”, clear displayed models, click “ Apply”, Generate a 3D simulation model again based on the formula, as shown in the following figure:



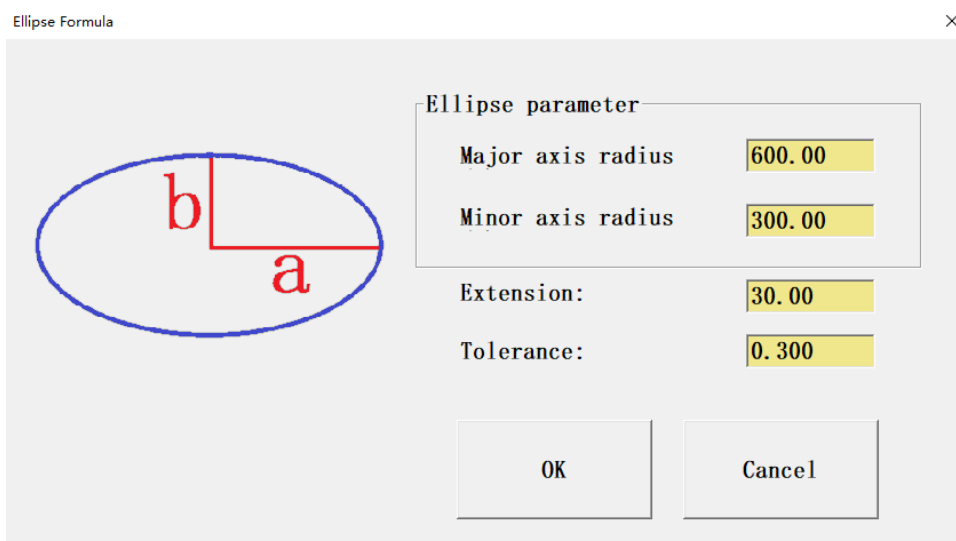
The data in the automatically generated formula may need to be modified or inputted, and the specific steps are exactly the same as those in steps 4-1. At this point, the profile formula editing is completed.

5.2 Formual editing (Standard arc)

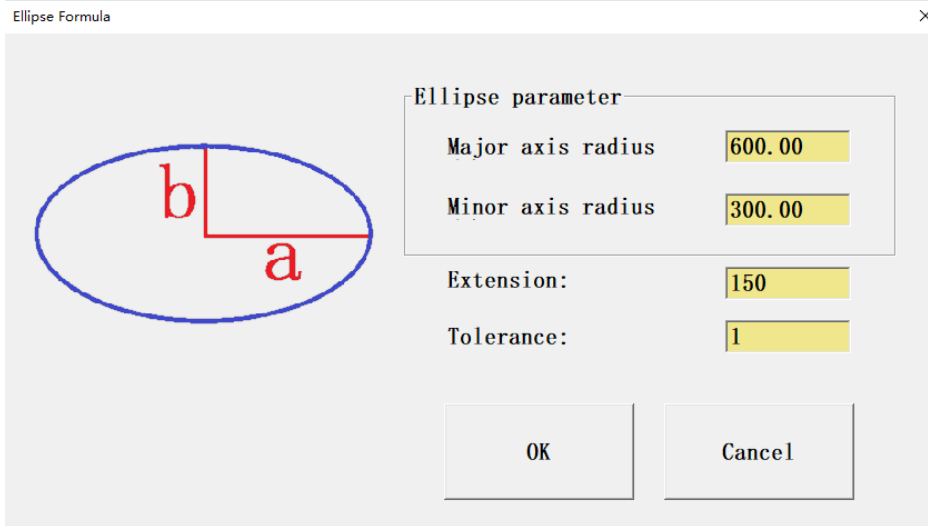
The standard arc mainly includes two types of arcs: elliptical and Archimedean spiral. The specific formula editing steps are as follows:

5.1 elliptical arc formula editing

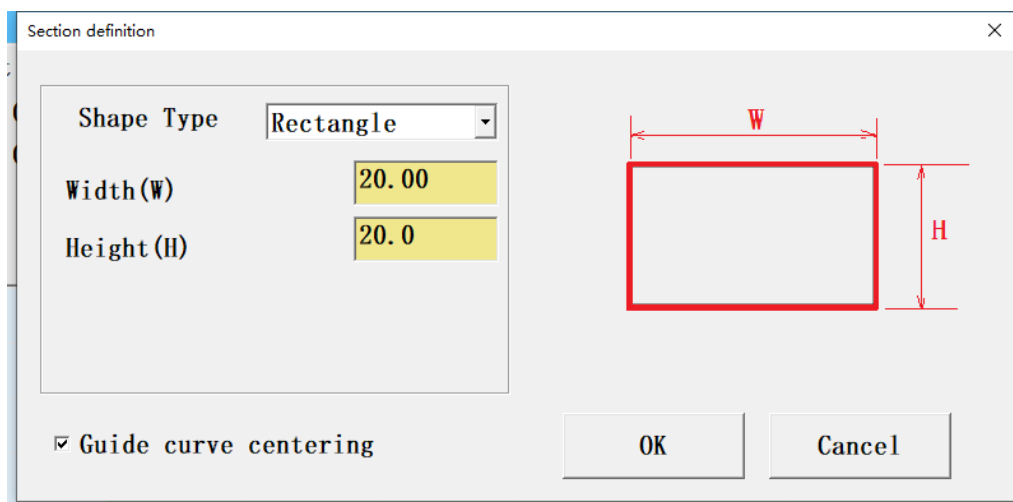
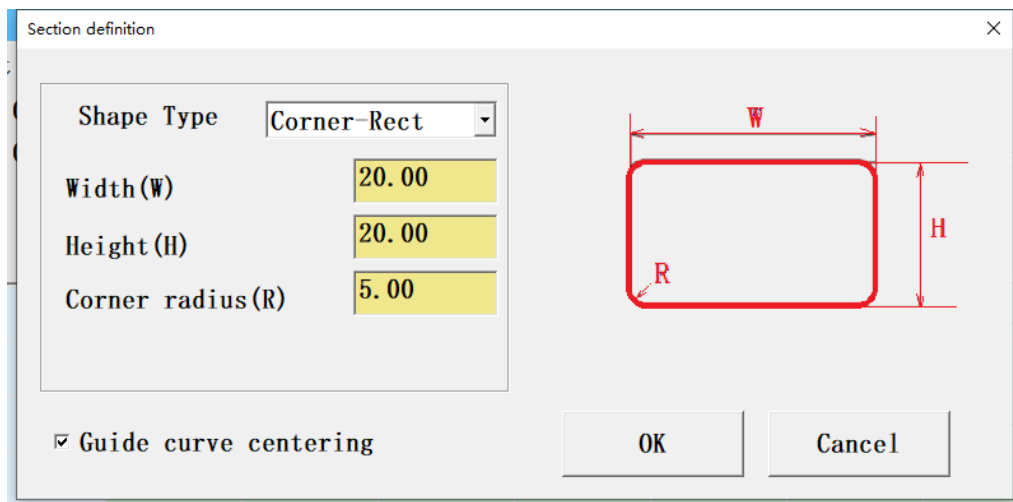
on “formula editing” interface, click “ Ellipse”, systems display:



Modify the ellipse parameters, and the modified parameters are as follows:



click “OK” , The system prompts you to select a cross-sectional shape, with a total of three cross-sectional shapes, as shown in the following figure:



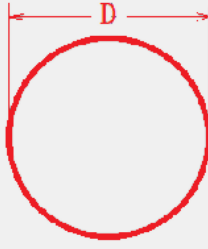
Section definition

Shape Type Circle

Diameter (D) 20.0

☒ Guide curve centering

OK Cancel

A diagram of a red circle with a horizontal dimension line above it labeled 'D', indicating the diameter.

Select one of the cross-sectional shapes, input the approximate cross-sectional dimensions, click the "OK" button, and automatically generate the processing formula and 3D model, as shown in the following figure:

New formula

Formula family 3R-Fomula

Formula name Ellipse-123

OK Cancel

The data in the automatically generated formula needs to be modified or inputted, and the specific steps are exactly the same as those in steps 4-1, as shown in the following figure:

Automatically generated data:

Model	2D Model	Feed times	1	Head L1	200.00	Tail L2	200.00	Total L...	7566.99
Velocity	7.50	Delay	5.00	Decrease	0.00	Y start	0.00	Y end	39.80
Fixed D1	120.00	Distanc...	350.00	Photoel...	280.00	Final t...	100.00	Retreat	10.00
drive D3	180.00								

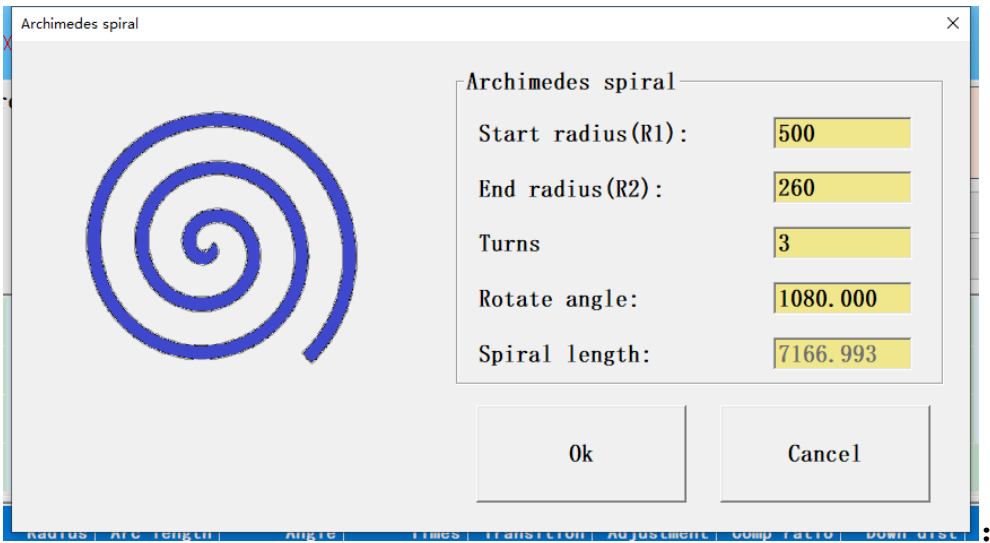
wherein:

Y start 0.00 it must inputted again, or click **Y start write** Import the data directly, and other data can be modified or not modified as needed. The operation steps are the same as the 4-1 formula editing method 1.

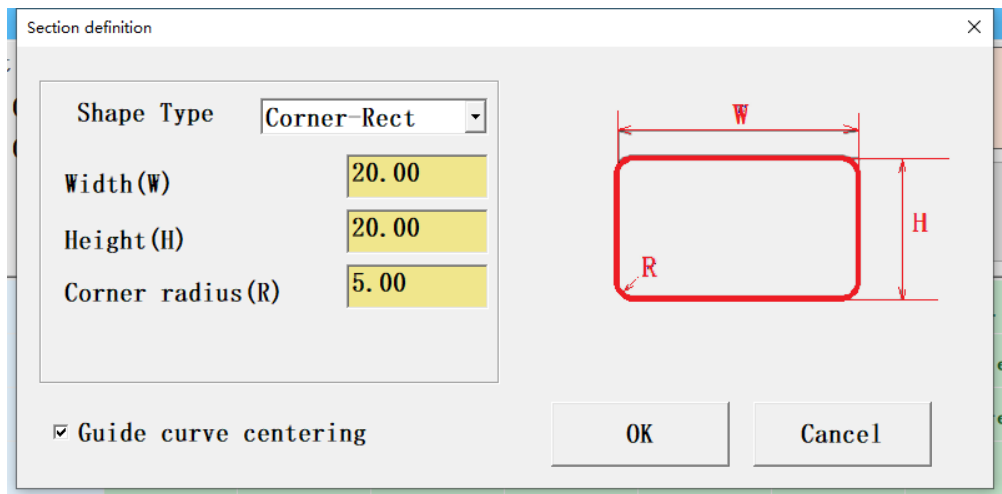
At this point, the elliptical formula editing is completed.

5.2 Archimedean spiral curve formula editing

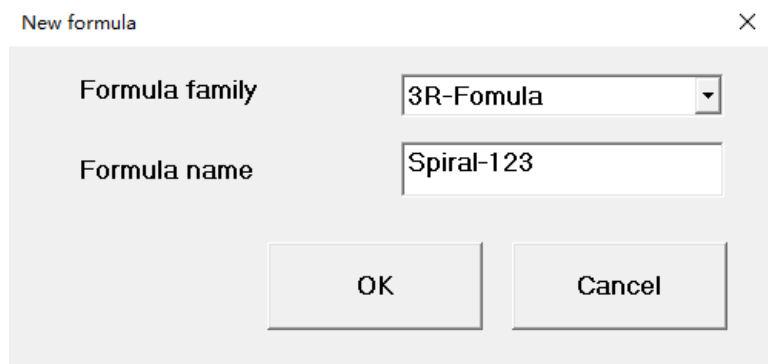
In the "Formula Editing" interface, click on **Spiral**, system display

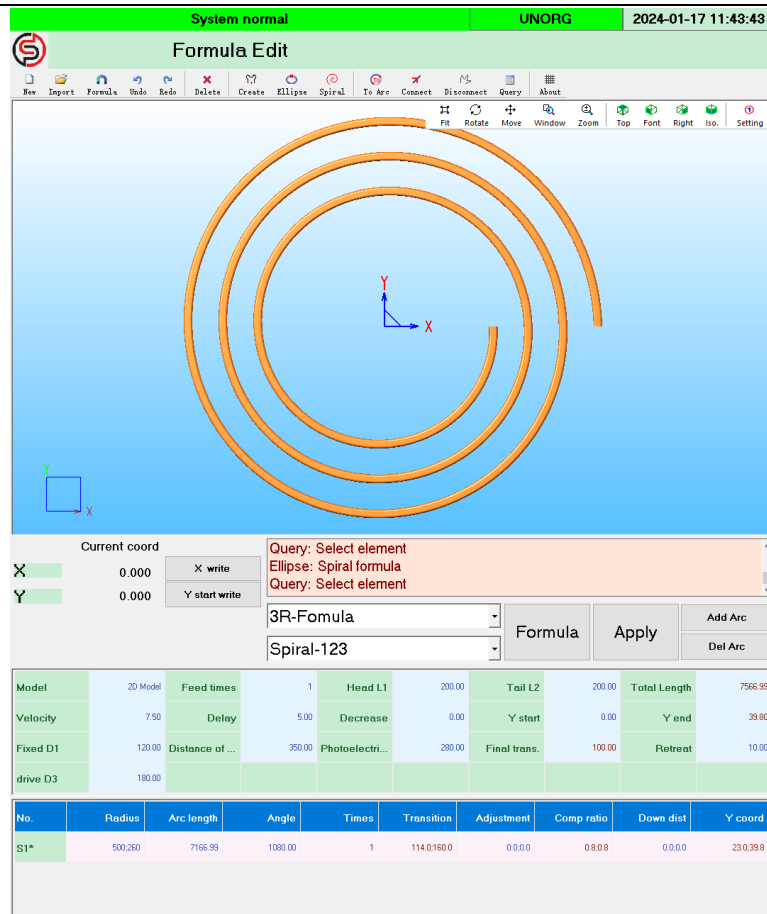



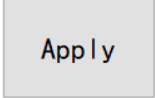
Modify the parameters of the Archimedean spiral. After modifying the parameters, click the "OK" button and the system will prompt you to select a cross-sectional shape. There are three cross-sectional shapes to choose from (the same as those provided by other formula editors). Select one of the cross-sectional shapes and enter an approximate cross-sectional size,

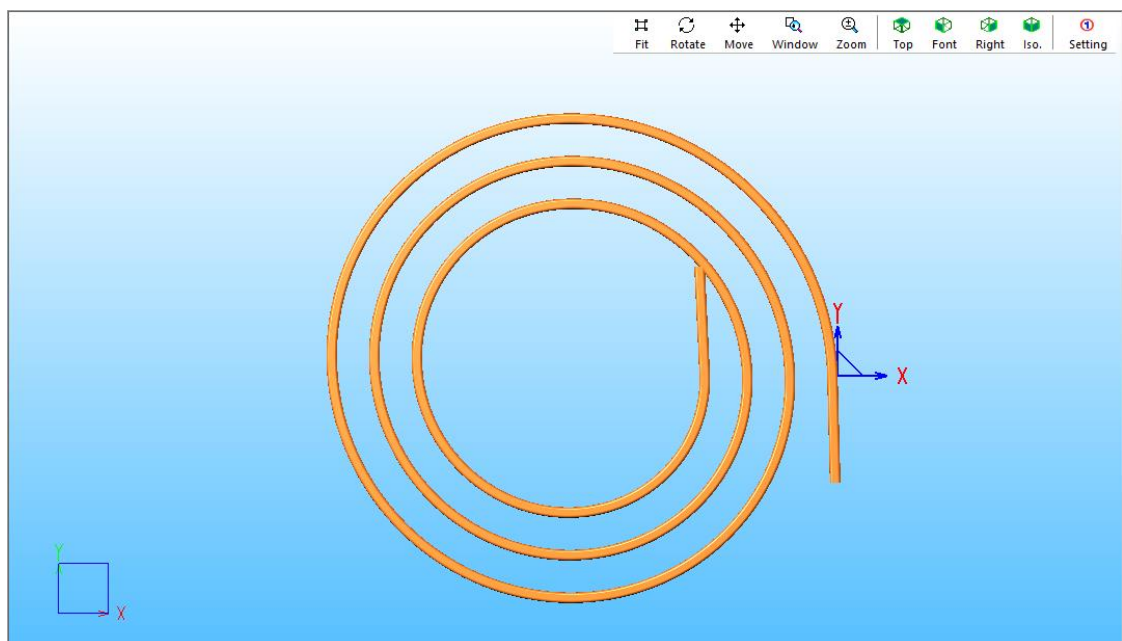


click "OK", Automatically generate processing formulas and 3D models, as shown in the following figure:





click “ New” ,then click “ Apply”, The complete 3D model is displayed in the model display box, as shown in the following figure:



The data in the automatically generated formula needs to be modified or inputted,

and the specific steps are exactly the same as those in steps 4-1, as shown in the following figure:

Automatically generated data:

Model	2D Model	Feed times	1	Head L1	200.00	Tail L2	200.00	Total L...	7566.99
Velocity	7.50	Delay	5.00	Decrease	0.00	Y start	0.00	Y end	39.80
Fixed D1	120.00	Distanc...	350.00	Photoel...	280.00	Final t...	100.00	Retreat	10.00
drive D3	180.00								

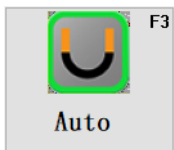
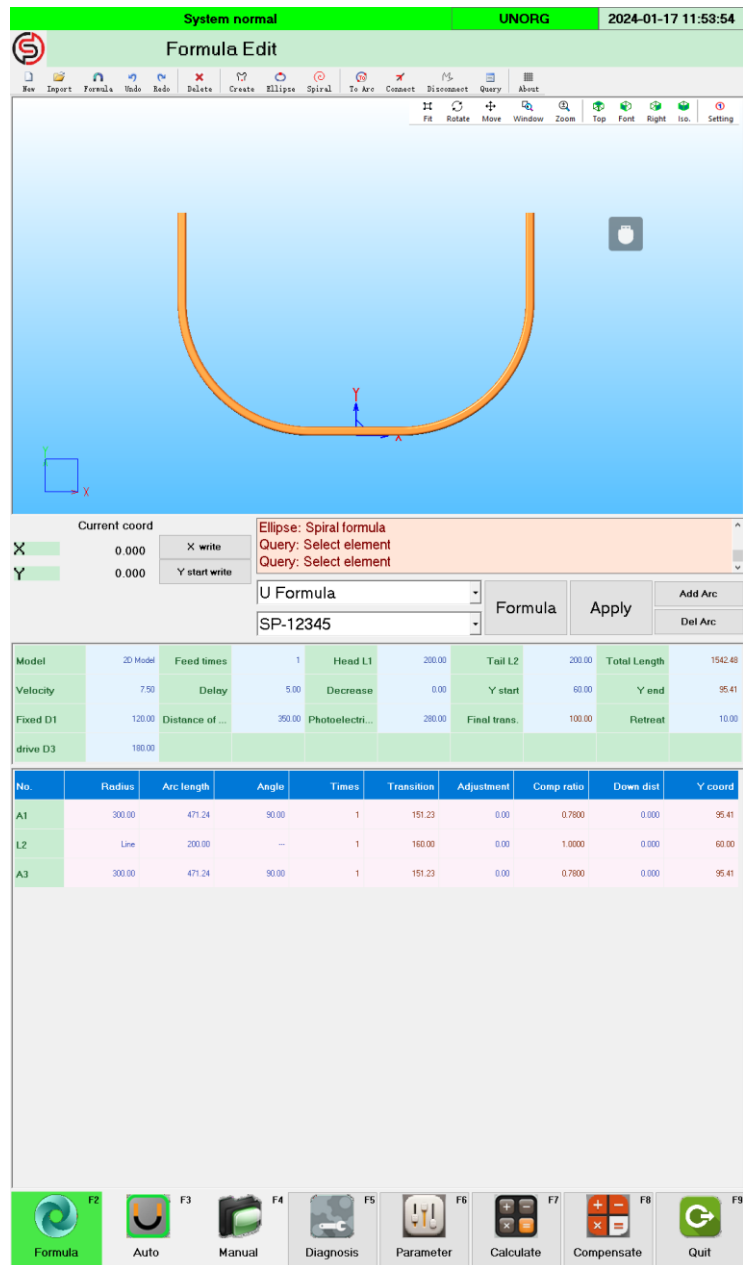
wherein:

Y start 0.00 must be inputted again, or click **Y start write** Import the data directly, and other data can be modified or not modified as needed. The operation steps are the same as the 3-1 formula editing method 1.

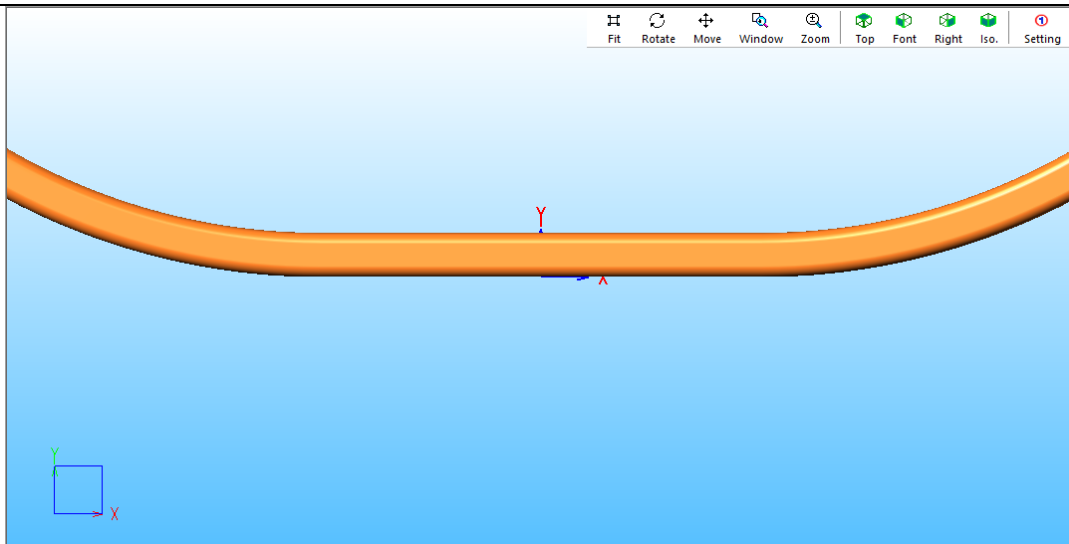
At this point, the editing of the Archimedean spiral curve formula has been completed.


6、Automatically Bending

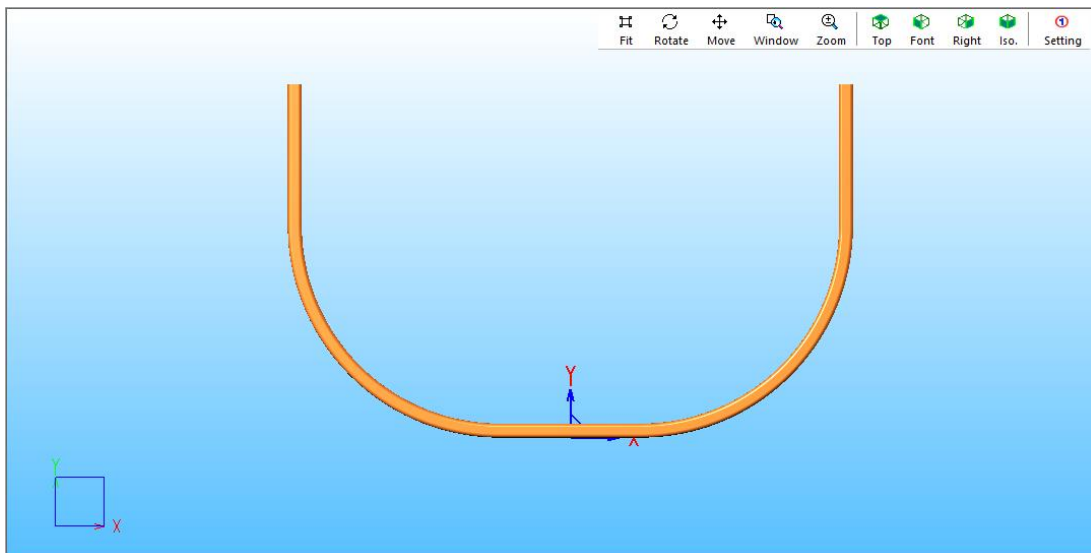
In the "Formula Editing" interface, select the formula corresponding to the workpiece being processed by the demand side, and click on it **Apply**", system display:



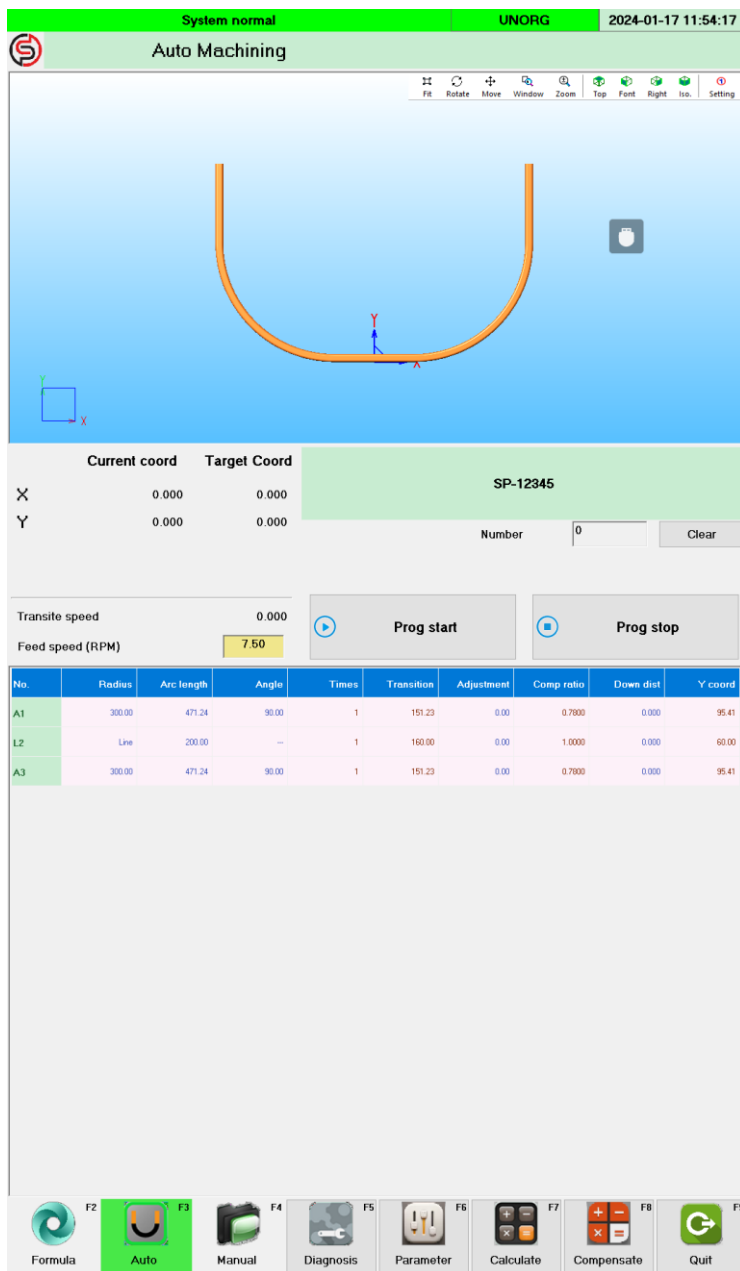
click “Auto”, Entering the automatic processing interface, if the model display is incomplete, as shown in the following figure:





click “ Fit”, The model will display normally, as shown in the following figure:



Auto machining display:



In “Auto machining” display, Put the workpiece/profile into the machine, with the left end of the workpiece located between the photoelectric detection switch and the left wheel. Click “ Prog start”once, Y Axis moving to start point, Clamping the workpiece, click “ Prog start” second time, The machine starts automatic processing and the processing is completed; Reinsert the workpiece and repeat the above operation.

Notify:

1、During automatic operation, the encoder wheel needs to be in close contact with the outer surface of the workpiece; When the workpiece moves, if the system detects that the encoder wheel is not working, the system will automatically give an alarm prompt.

2、If the bending radius of the processed workpiece is not accurate, in the "Formula Editing" interface, the compensation ratio of the workpiece can be corrected by modifying the " Down Dist" data. The specific operation steps are as follows:

Original formula $R=300\text{mm}$, as below:

No.	Radius	Arc length	Angle	Times	Transition	Adjustment	Comp ratio	Down dist	Y coord
A1	300.00	471.24	90.00	1	151.23	0.00	0.7800	0.000	35.41
L2	Line	200.00	—	1	160.00	0.00	1.0000	0.000	0.00
A3	300.00	471.24	90.00	1	151.23	0.00	0.7800	0.000	35.41

Down dist

0.000

If the profile actual arc, $R=350\text{mm}$, click “

Compensation factor calculation

Measured radius

299.999

Original coeffi (K0)

0.7800

Corrected down

0.000

New coeff (K1)

0.7800

OK

Cancel

Put measured radius $R=350\text{mm}$ inputted, automatically calculate “corrected down”:

Compensation factor calculation

Measured radius

350

Original coeffi (K0)

0.7800

Corrected down

3.3951

New coeff (K1)

0.8548

OK

Cancel

click “OK”, New data will be inputted as below:

No.	Radius	Arc length	Angle	Times	Transition	Adjustment	Comp ratio	Down dist	Y coord
A1	300.00	471.24	90.00	1	161.41	0.00	0.8548	3.395	38.80
L2	Line	200.00	—	1	160.00	0.00	1.0000	0.000	0.00
A3	300.00	471.24	90.00	1	161.41	0.00	0.8548	3.395	38.80

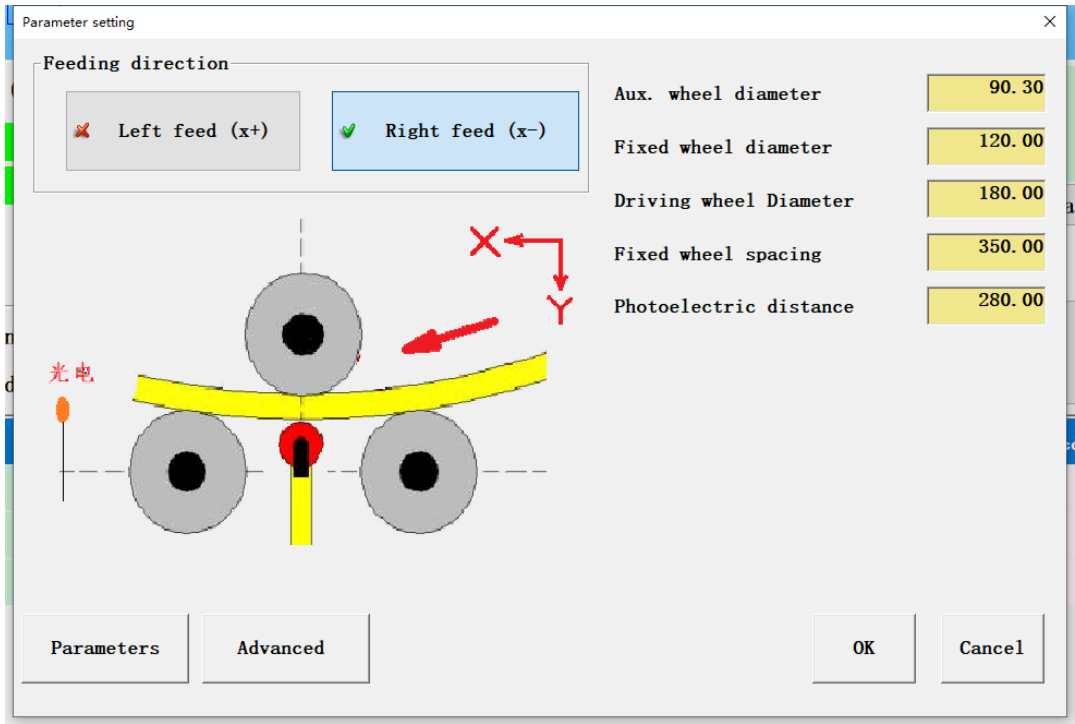
Apply

“Down Dist” data corrected, click “Apply”, generate 3D models again, then enter “Auto machining” display, start bending again.

7、Parameters



Click touch button, The screen enters the "Parameter Settings" interface, as shown below:



When processing different workpieces, different workpieces correspond to

different molds and equipment parameters are also different, so careful setting is necessary. The commonly used equipment parameters involved in processing include:

Aux wheel diameter: 90.3mm it is no need of adjustment usually;

Fixed wheel diameter: The minimum outer diameter of the wheel molds on both sides,

This data can be accessed by clicking on the "Manual Operation"

interface "Diam." check; or You can click on it in the "Formula Editing"

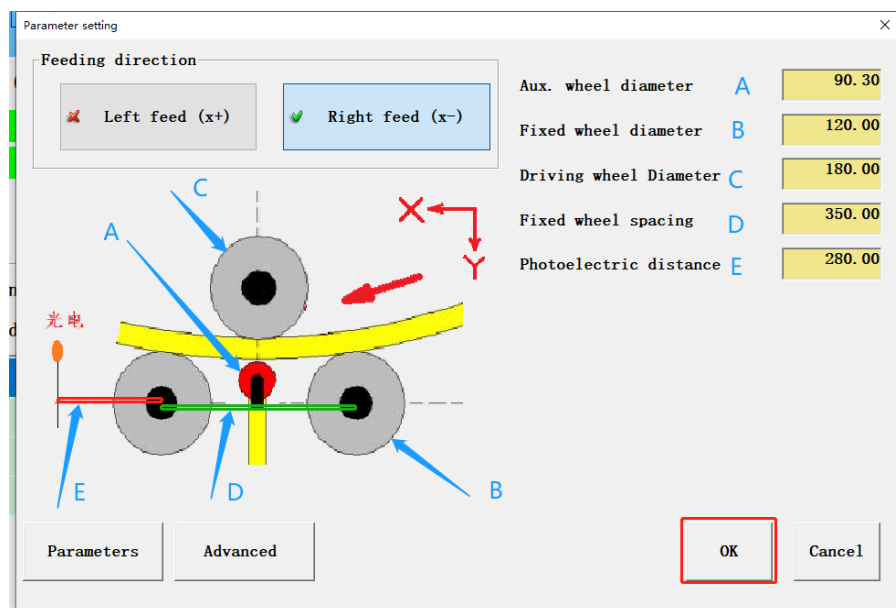
interface "X write" automatically add to the formula.

Driving wheel diameter: Minimum outer diameter of middle wheel

Fixed wheel spacing: Distance between the main axes wheels on both sides

Photoelectric distance: The distance between the photoelectric switch and the left mold main wheel

The schematic diagram is shown in the following figure:



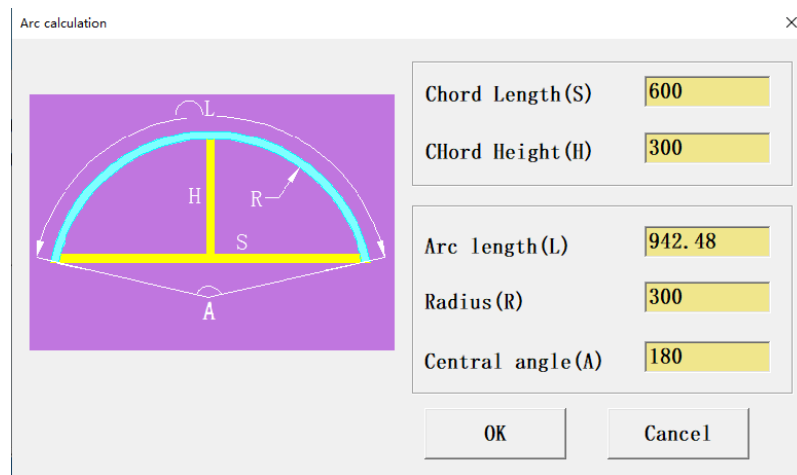
Please ensure that the above device parameters are set correctly before clicking

“OK” then enter “formula editing” interface to edit formulas。

8、Aux. Arc Calculation



Click touch button, The screen enters the "Arc Calculation" interface, as shown below:



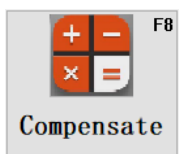
Auxiliary arc calculation is to facilitate the detection of whether the actual machining radius of the workpiece meets the requirements of the drawing in practical use. If it does not meet the requirements of the drawing, the actual radius size can provide a calculation basis for the rebound data of the material.

Auxiliary arc calculation provide two types,

- (1) One type is the calculation of arcs smaller than semicircles,
- (2) One type is the calculation of arcs larger than semicircles,

calculate: A arc Known as S Data and H data, Find arc R data and L data。

9、Compensation factor calculation



Click , system display:

Compensation factor calculation	
Target radius	400
Measured radius	350
Fixed wheel radius	60
Fixed wheel spacing	350
Original coeffi (K0)	0.8
New coeff (K1)	0.74
Corrected down	0.0
<input type="button" value="Calculate new coeffi"/>	
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

The "Compensation factor Calculation" function corrects the arc that produces errors by calculating and modifying the bending compensation coefficient of the profile. Due to different profiles and hardness, the rebound coefficient of various profiles also varies. In the actual production process, the rebound coefficient of profiles increases with the increase of bending radius, which is an irregular linear relationship. The compensation coefficient when the production equipment processes the first arc is a data input randomly based on production experience, The produced arc may not necessarily reach the required size, so a new compensation coefficient needs to be calculated through the "compensation correction" function to make the bent arc closer to the demand;

Using as follows:

"Compensation factor Calculation" interface, input following data:

A、fixed wheel radius: When the profile is putted against the molds, the outer circle size of the wheel is calculated based on the contact point between the outermost edge of the profile and the wheel;

B、Fixed wheel spacing: using formula data

C、Target Radius: arc radius needed;

D、Measured radius: The radius of the arc formed by the first actual machining bending;

E、original Coeffi K0: Compensation coefficient inputted on the first bending. After inputting, press "Ok" and the system will automatically calculate the new coefficient K1 and the downward pressure correction value. After inputting the downward pressure correction value into the arc formula, press the "Apply" button to enter the processing interface again and restart production and processing.

10、Diagnostic maintenance



Click , System display:

The screenshot displays the 'Diagnosis' (F5) screen of a CNC system. The interface is divided into several functional zones:

- 轴状态 (Axis Status):** A table showing the status of 8 axes (1. Fixed wheel X1, 2. Moving axis Y, 3. Fixed wheel X2, 4. Drive wheel X3, 5. Encode X, 6. Grating ruler Y, 7. Axis, 8. Axis). It includes columns for 'Neg. limit (-)', 'Pos. limit (+)', 'origin', 'Alarm', and 'Enable'.
- 输入信号 (Input Signal):** A section for monitoring various input signals like Emergency Stop (DI-0), Auto run button (DI-1), Photoelectric signal (DI-6), Forward button (DI-2), back button (DI-3), Move left button (DI-4), and Move right button (DI-5).
- 输出信号 (Output Signal):** A section for monitoring output signals, with a note: 'Alarm: the output signal is executed immediately and must be operated by professional personnel of the manufacturer.'
- 报警处理区 (Alarm Handling Area):** Displays the current alarm code (0x0-0) and a '清除报警' (Clear Alarm) button.
- 高级调试区 (Advanced Debugging Area):** Includes buttons for '报警历史' (Alarm History), '运行日志' (Run Log), '轴坐标值' (Axis Coordinate Value), and 'Y轴补偿测量' (Y-axis Compensation Measurement).

The bottom of the screen features a navigation bar with icons for F2 (配方编辑), F3 (自动加工), F4 (手动操作), F5 (诊断维护), F6 (参数设置), F7 (辅助计算), F8 (补偿计算), and F9 (退出系统).

10.1、Clear alarms

When an alarm occurs in the system, switch to the "Diagnosis " interface and view the detailed information of the "Alarm Processing Area".

Alarm processing area prompt: Description of alarm problem, reason for alarm, and handling method.

Users follow the prompts to process the alarm, and then click the "Clear Alarm" button to clear the system alarm.

For example, when the system prompts the negative limit of Y-axis pressure, the user first moves the Y-axis forward to move away from the negative limit, and then clicks the "Clear Alarm" button, and the system alarm will be cleared. The axis control signal and input signal are important criteria for judging whether the system has abnormalities. When a system alarm occurs, the first step is to check whether there are abnormalities in the processed axis control signal and input signal.

10.2、output signals

In the "Diagnosis " interface, the output signal is executed in real-time, Professional training and guidance from the manufacturer are required before conducting professional operations. The equipment is set to a shielded state before leaving the factory (content is not displayed)

七、Maintenance

To maintain the continuous normal operation of the bending machine, reliably reduce component damage, and extend its service life, it is necessary to implement the maintenance

system of the CNC bending machine.

1. Daily maintenance: maintain once per shift.

1.1 Check the fastening bolts and nuts at all locations and tighten them.

1.2 Check the connection status of each institution, and if there are any abnormalities, they should be cleared. Lubricate the horizontal slide rail and retractable universal joint.

1.3 Check the electrical system: After connecting the power, check the rotation direction and operation of the motor.

1.4 Keep the arc bending machine clean and regularly clean the dirt inside the machine.

Lubricating the spindle feed screw every 2 days.

2. Technical maintenance: Check the mold to ensure that it is intact and undamaged.