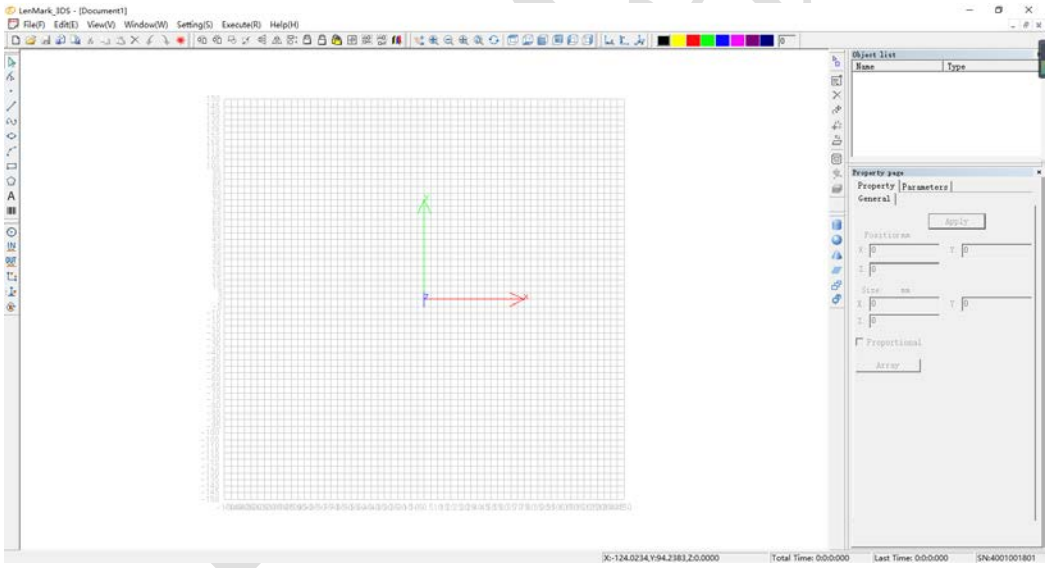
FEELTEK 菲镭泰克	Document Name	Version
APPROVED	LenMark Software---3D surface and relief	2017.2.0

Chapter 1. Software Instruction

The function of this software is similar to 3D software, newly add 3D surface and relief marking function, the software main interface has been modified, please see below pic1



Pic1 Software main interface

As shown above, there are a total of 7 items in the 3DS menu bar: file, edit, view, window, system setting, implementation, help. The edit menu bar including 3 functions: drawing, scheduling, expansion command.

On the right side of software drawing area, newly add 3D surface and relief marking toolbar, the frequent tools for 3D surface and relief marking are: work space view switching,3D edition and 3D drawing.

Chapter 2 Function Instruction

1. Software basic function

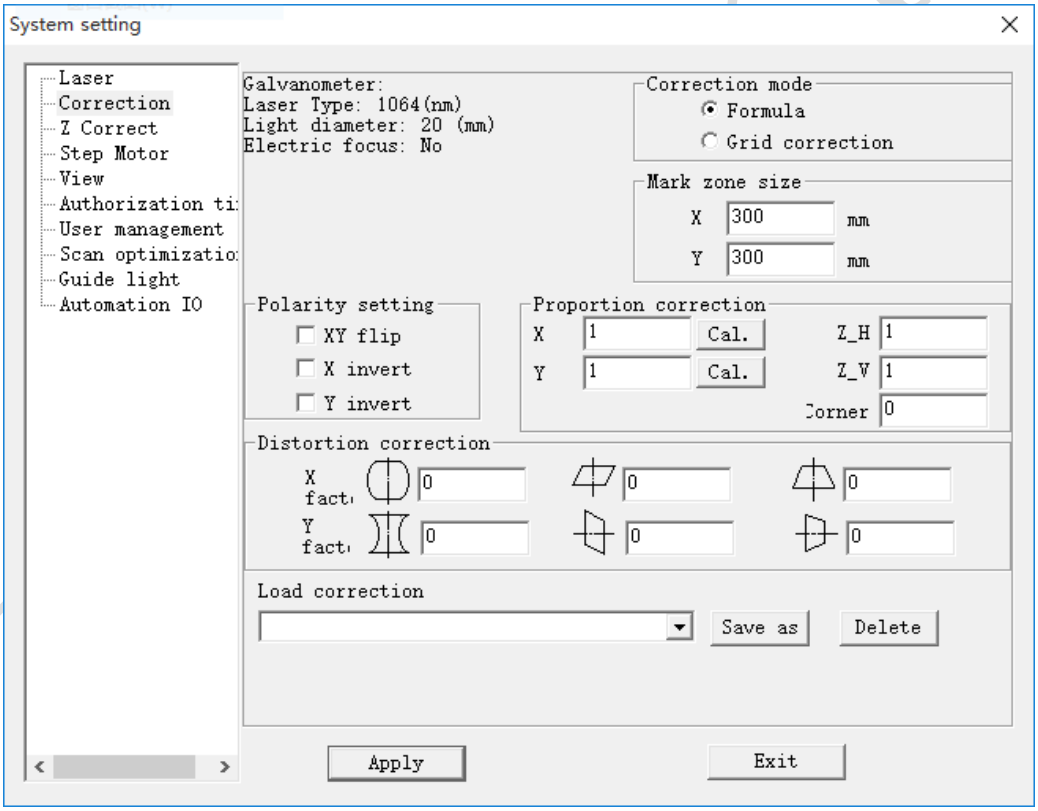
1.1 Marking area settings

There are two correction methods opened in the LenMark_3DS: Formula correction and Grid correction. The following two methods are introduced respectively combined with different marking area setting.

Formula correction

Suit for fast image correction, it can be used to adjust the proportion of graphics, barrel shape and pincushion distortion.

Click “marking area” setting in the “system configuration, then enter to the “Datum plane correction” interface, select the “correction method” as “formula method”, see below pic 1-1-1



Pic 1-1-1 Formula correction interface

Operation:

1. Set laser basic parameter

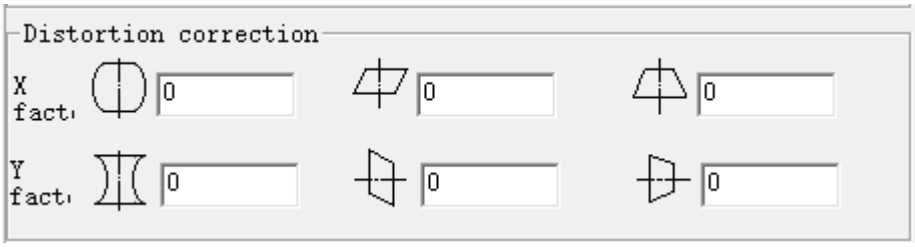
1) Select “Datum plane correction” in the system configuration, choose “formula method” as the correction method

2) Set the maximum marking range accord to the field

2. Distortion correction

1) Mark a square with the largest marking area on the workbench

2) Check whether the actual marked square has either X axis or Y axis distortion. Set the correction factor of X axis and Y axis through the “distortion correction” in the “datum plane correction”. See below pic 1-1-2



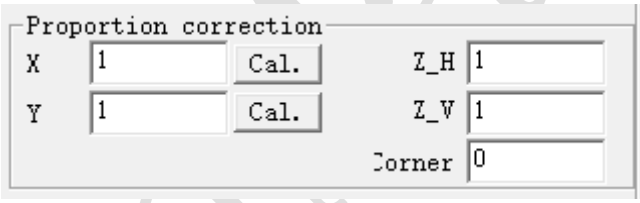
Pic 1-1-3 Distortion correction interface

Note: Normally, the setting factor of barrel distortion is positive, the setting factor of pincushion distortion is negative. The correction factor range is -1 to 1.

3) Click “OK” to mark, observe and see whether the marked square has distortion. If there is still has distortion, please do the minor correction factor adjustment accord to the same method.

3. Proportion correction

Due to the problem of system coordination, the image size in the drawing area will not be consistent with the actual marking image, at this circumstance, it should be fixed through proportion correction.

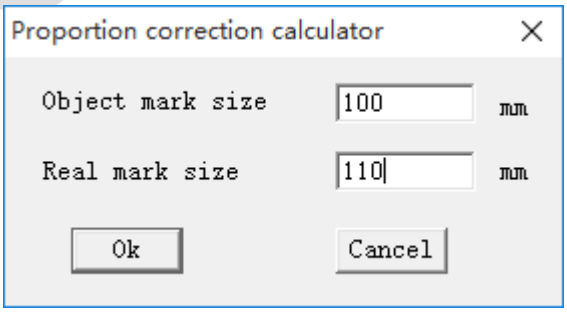


Pic 1-1-3 proportion correction interface

1) Mark square

2) Test the X and Y dimensions of the actual test rectangle

3) Click “calculate” button in the X axis and Y axis proportion correction separately, then it will come to the following dialog box (pic 1-1-4)



Pic 1-1-4proportion correction calculate interface

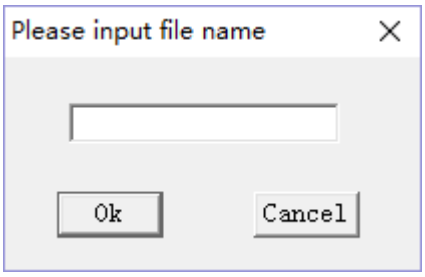
Fill in the target marking dimension and actual marking dimension in the dialog box

4) Click “marking” button, observe whether the marked rectangle is consistent with target rectangle. If there’s distortion, then do a minor adjustment.

4. Save correction parameter file

If need to save current correction parameter, click “save as”, then it will pop up the following (pic 1-1-5) dialog box, fill in the correction file name, confirm it then it will save to the

default path for future use.



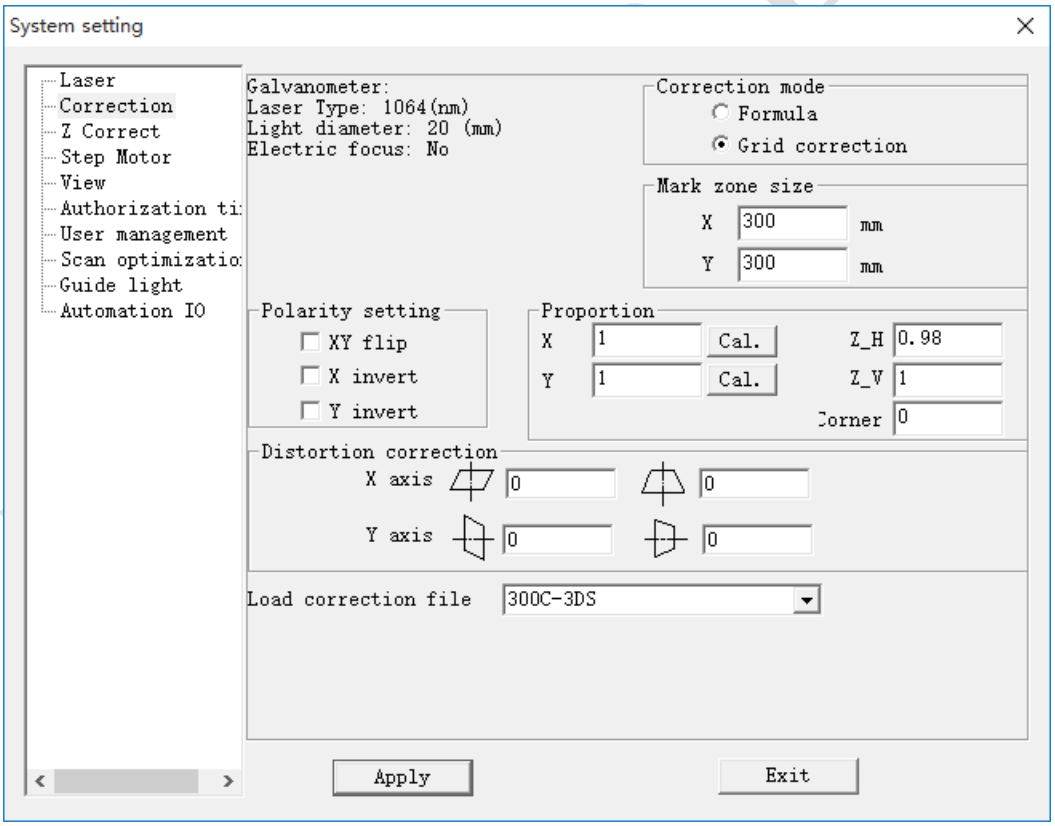
Pic1-1-5 text dialog save settings

Note: if the scanner has distortion, it is suggest do distortion correction prior to proportional correction.

Grid correction

Suit for image precise correction

If select “Grid method” in the “system configuration --datum plane correction”, the interface is as below pic 1-1-6, Apply different scanners’ library file in accord with different material number in the installation wizard:



Pic 1-1-6 Grid correction interface

Parameters instructions:

Mark range: When using Grid correction method, mark range is set accord to customer’s correction file.

Polarity: During the actual marking process, it is set according to operator’s standing position.

Proportion factor: When there’s slight adjustment in the focal plane of the marking field, it may lead to changes in the marking image range. For example: initial adjustment 100*100

may become 101*101, no need change on the database at this circumstance. It can be corrected back to 100*100 by adjusting the proportion.

Distortion: Adjust the deformation

Transfer correction file: Call the correction table software to correct the saved file, and then click the drop-down button to pop up the saved file for selection.

Note: for the detailed procedure, please refer to "correction software operational manual"

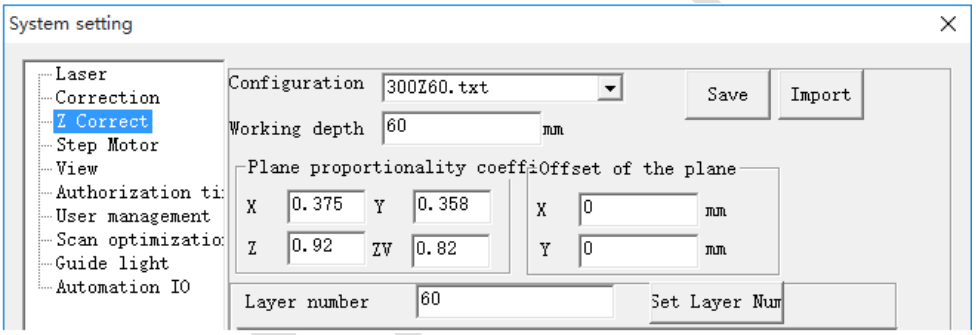
1.2 Z-direction correction

After inputting correction file in the benchmark , the system will automatic call the configured Z correction file in accord to working field, it can also modify Z direction correction file manually; Here takes correct 300mm field for example.

1. System configuration--Z direction correction

1) Set layer

Click "System configuration- laser setting" in the software, open "system configuration" dialog box, select "Z direction correction" function, set the depth to 60, layers to 60. See below pic1-2-1

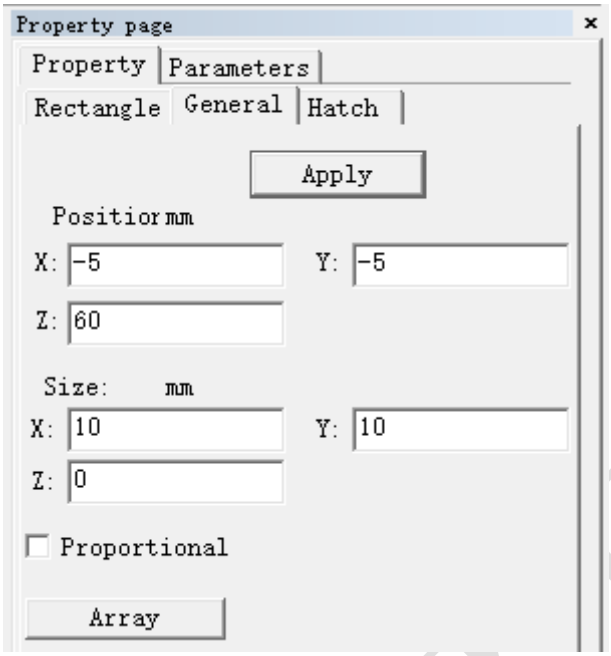


Pic1-2-1 Layer setting interface

After setting, click "Apply" button.

2) 0 layer correction method

Draw a rectangular box 10*10mm in the center of coordinates position, set the Z direction of rectangular coordinates position as 60, the detailed parameter is as below pic 1-2-2

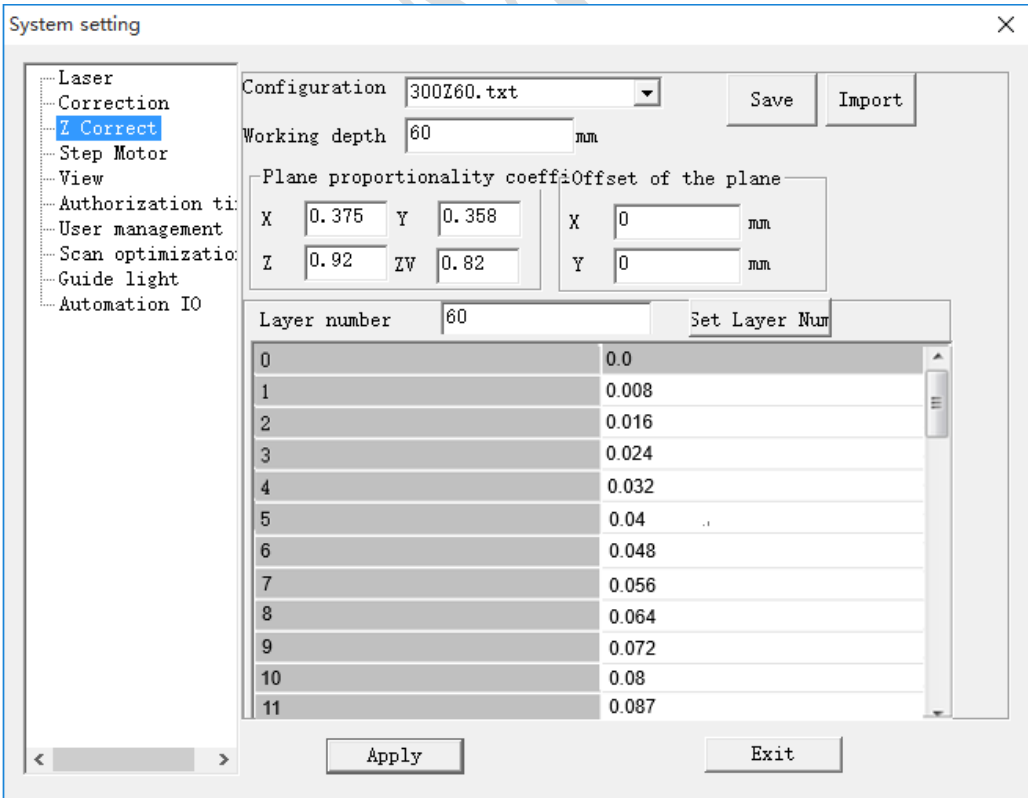


Pic 1-2-2 Parameter settings

Adjust the vertical distance from workbench to the bottom of marking head to 360mm, adjust Z axis motor position to positive focus manually.

3) Residual layers correction

Set the depth and layer to 60, correct Z direction deviation every 1 mm. See below pic1-2-3



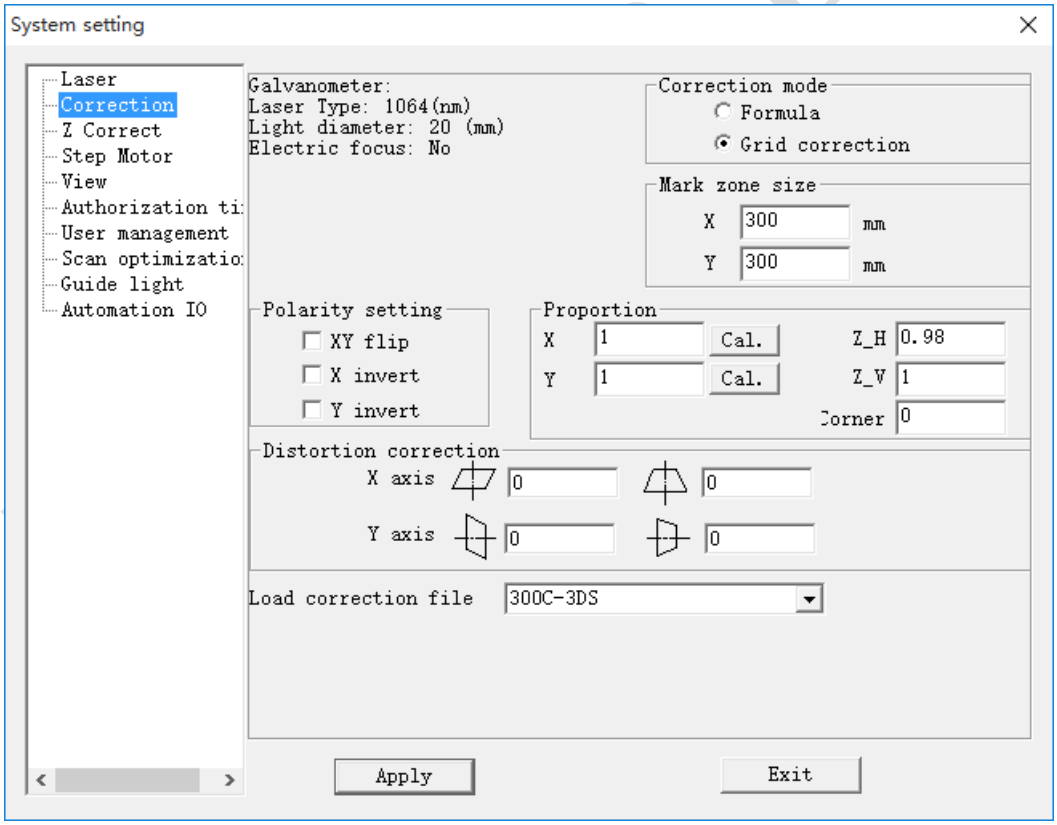
Pic 2-1-3 Z direction correction dialog box

Zeroth layer: Set to 0.0

1st layer: Adjust vertical distance from workbench to the bottom of marking head to361mm.Set Z direction of rectangle coordinates position to 59, modify 1 layer deviation and make the marking light spot strongest.1=0.008 (subject to the actual correction parameters)
2nd layer: Adjust vertical distance from workbench to the bottom of marking head to 362mm.Set Z direction of rectangle coordinates position to 58, modify 2 layer deviation and make the marking light spot strongest.1=0.016 (subject to the actual correction parameters)
.
.
.
(Set to the sixtieth layer with the same method)

2. Z axis correction of datum plane

After adjusting vertical distance from workbench to the bottom of mark heard to 360mm, set Z direction coordinates position of rectangle to 60, Move the rectangular box on the edge of the upper and lower four positions, adjust the Z axis proportion (horizontal-Z, vertical-Z, Corner-Z) of datum plane and make the edge at the same focal point. (This step can be done on the 0 floor). Please see below pic1-2-4

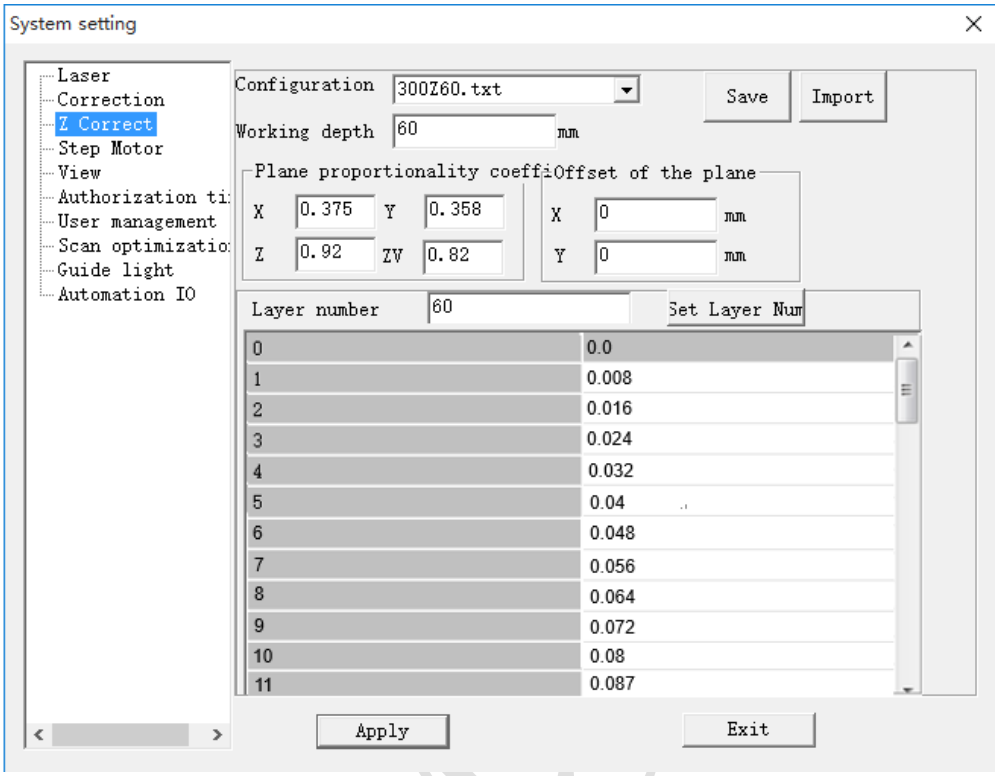


Pic 1-2-4 Datum plane correction interface

3. Z direction correction- compensation plane proportion

After setting the vertical distance from workbench to the bottom of marking head to 420mm, draw a rectangle 300*300mm in the center of coordinates position, the Z position coordinate is 0, adjust compensation plane proportion X Y parameter, make the mark rectangle 300*300mm, modify rectangle to 10*10mm, move the rectangular box on the edge of the upper and lower four positions, adjust datum plane proportion Z parameter and make the light

spot strongest on the four positions, please see pic1-2-5



Pic 1-2-4 Z direction parameter

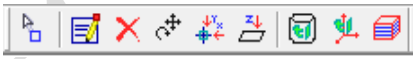
Note: The same functionality as the 3D software will not be introduced here. For the details, please refer to "LenMark_3D" software instruction.

2. 3D surface marking brief introduction

2.1 Tools description

3D surface marking tools are as following:

Workspace view switching tools: 

3D edition buttons: 

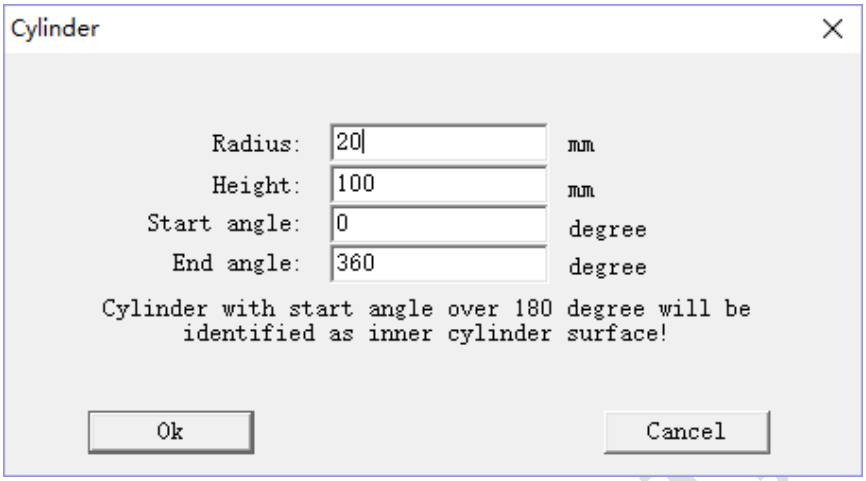
Drawing buttons: 

2.2 Model editing tool

2.2.1 Modeling tool

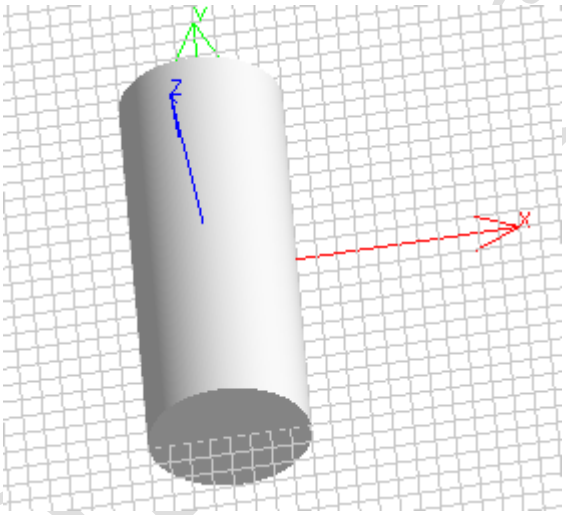
Cylinder

Click the shortcut key cylinder , pop up cylinder dialog box, see pic2-2-1



Pic 2-2-1 Cylinder setting dialog box

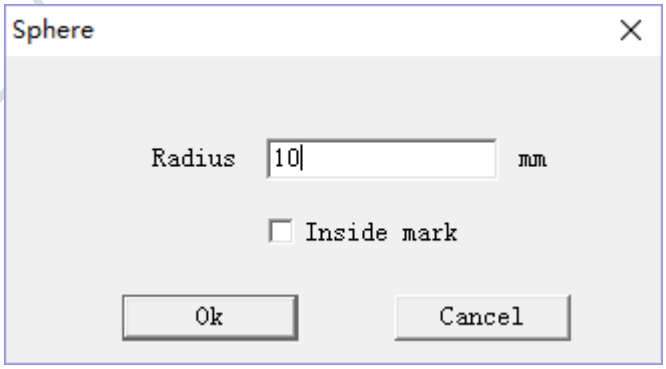
Adjust above parameter, confirm it and set the following image:



Pic 2-2-2 Cylinder

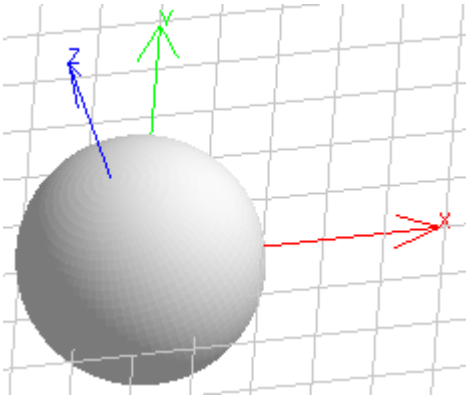
Sphere

Click shortcut key of sphere ,pop up sphere dialog box,see below pic 2-2-3



Pic2-2-3 Sphere dialog box

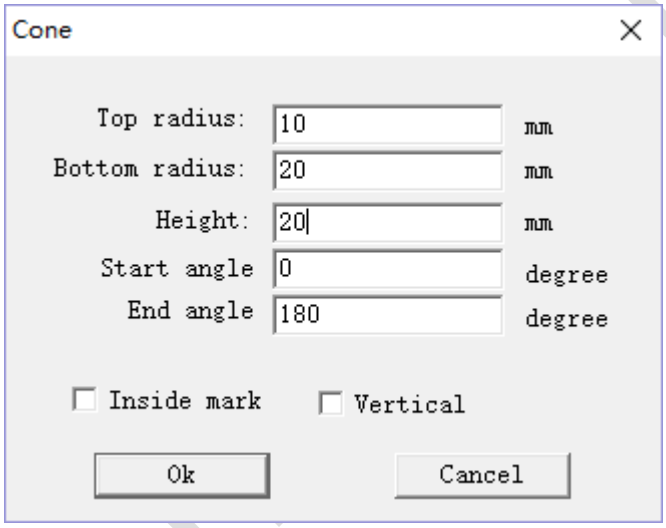
Set the radius to 10,click “OK” button, see below pic2-2-4



Pic 2-2-4 Sphere

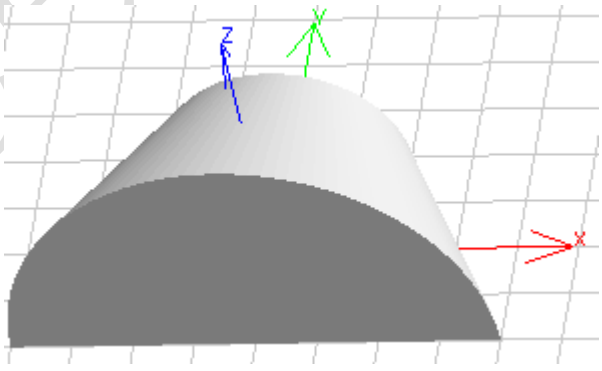
Cone

Click shortcut key of cone , pop up cone dialog box, see below pic2-2-5



Pic2-2-5 Cone dialog box

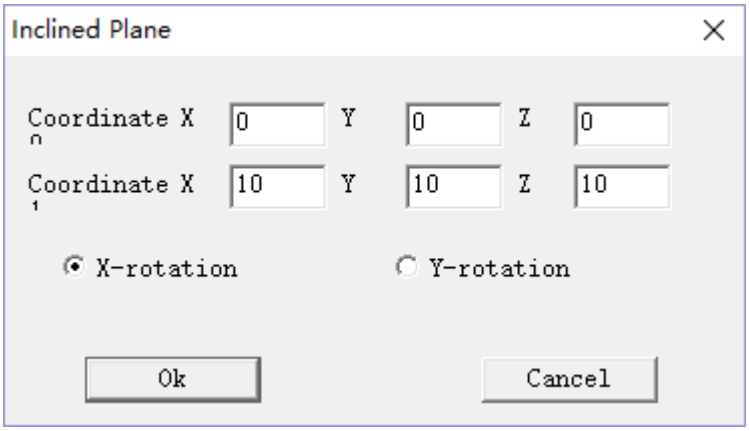
Set cone parameter, confirm it and see below pic2-2-6



Pic 2-2-6 Cone

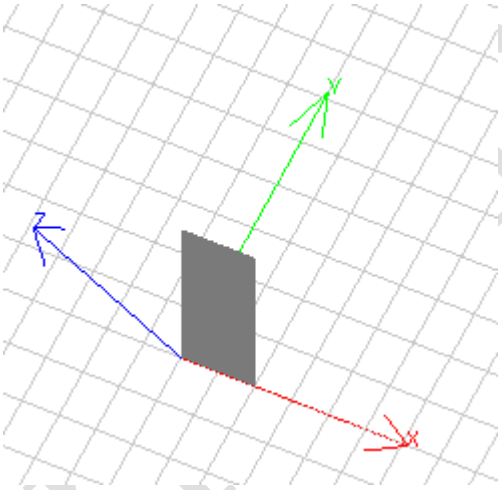
Inclined plane

Click shortcut key of inclined plane ,pop up inclined plane dialog box, see low pic2-2-7



Pic 2-2-7 Inclined plane dialog box

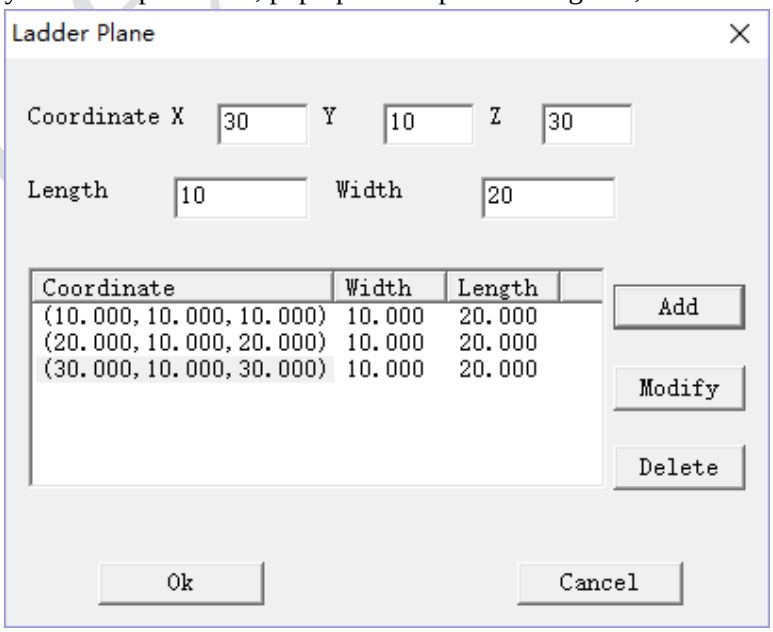
Set inclined plane parameter, confirm it and see below pic2-2-8



Pic 2-2-8 Inclined Plane

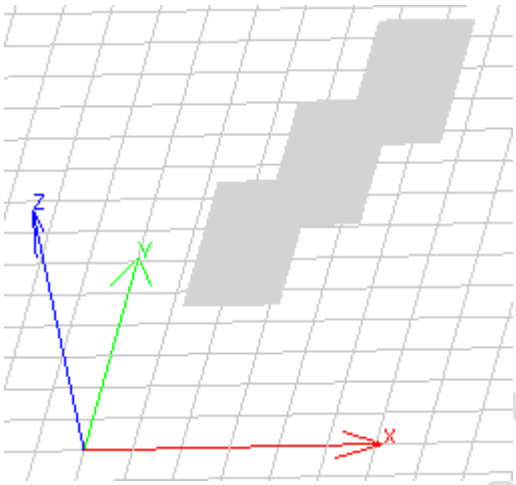
Ladder Plane

Click shortcut key of ladder plane , pop up ladder plane dialog box, see below pic 2-2-9



Pic 2-2-9ladder plane dialog box

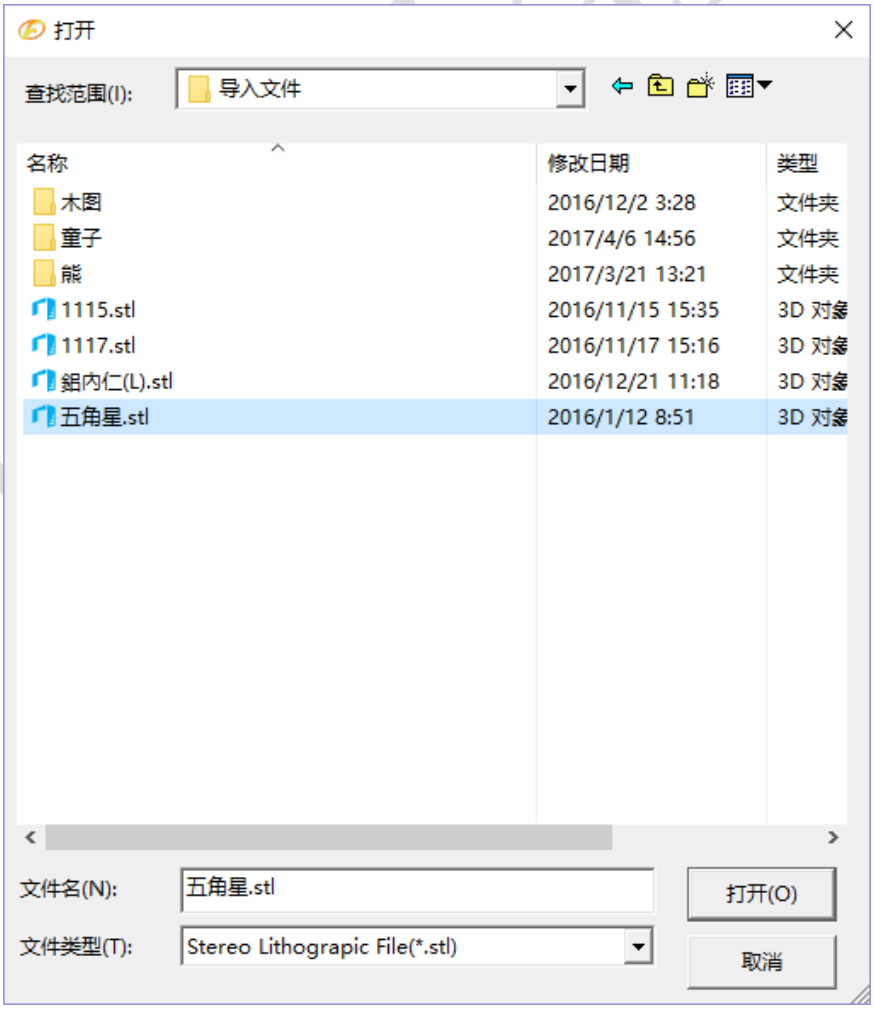
See above parameter setting, each ladder plane for one value, currently we have set 3 planes, click “OK” button, see below pic2-2-10



Pic 2-2-10 Ladder plane

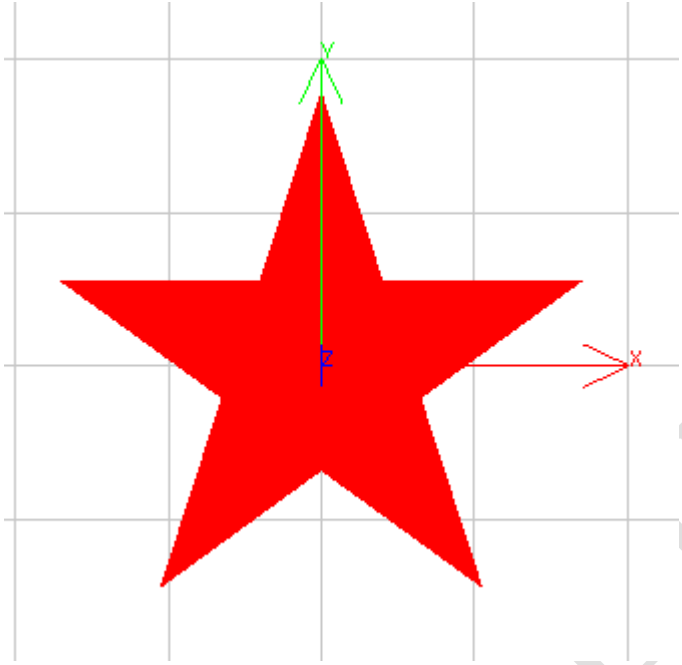
2.2.2 Model import tool

Click  button, pop up “Open dialog box”， it can import format of .stl file, see below pic2-2-11



Pic 2-2-11Open interface

After selected the file, click “open” button, can import model, see below pic 2-2-12

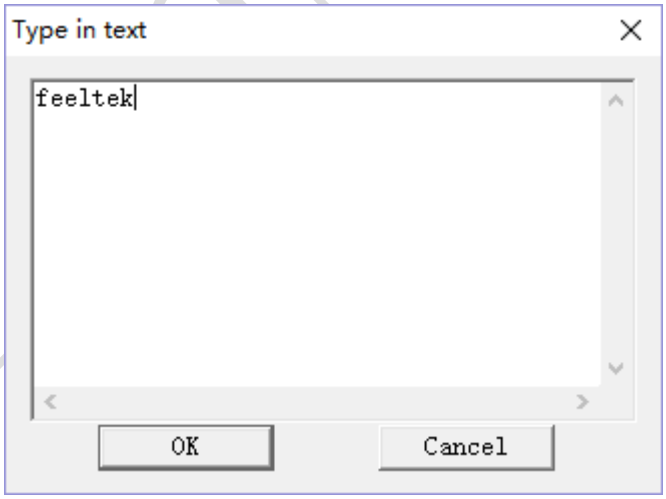


Pic 2-2-12Import interface

2.3 Map

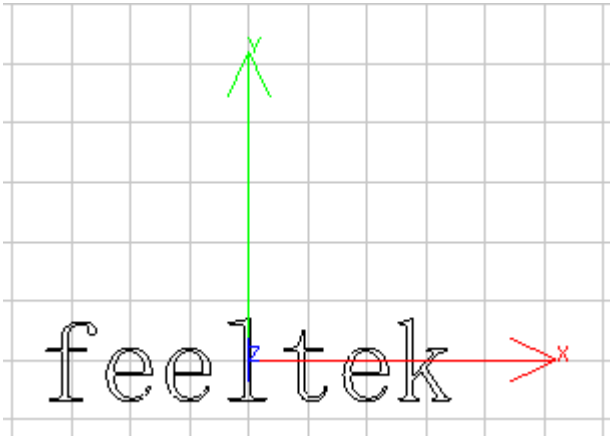
Attach a flat object to the model. Here takes a text map for example.

1. Click shortcut key of text A, single click in the drawing area, pop up text dialog box, input “feeltek”, see below pic 2-3-1



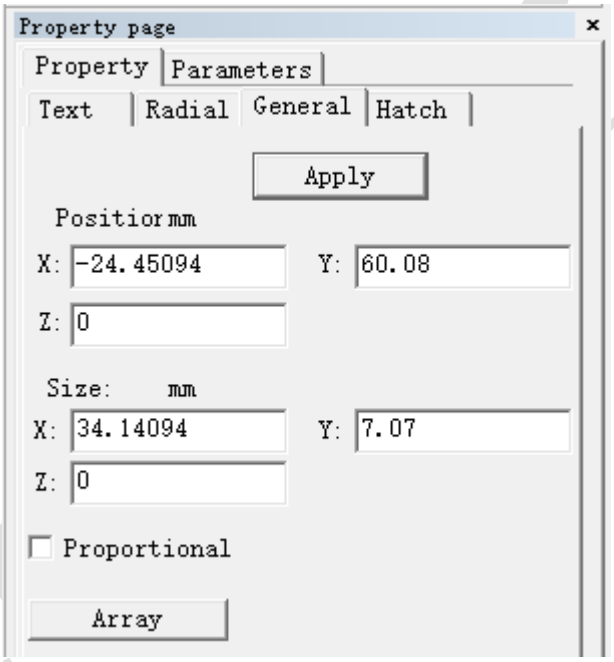
Pic 2-3-1 Text input dialog box

Click “OK” button, the drawing area interface is as follows:



Pic 2-3-2 Interface after entering text

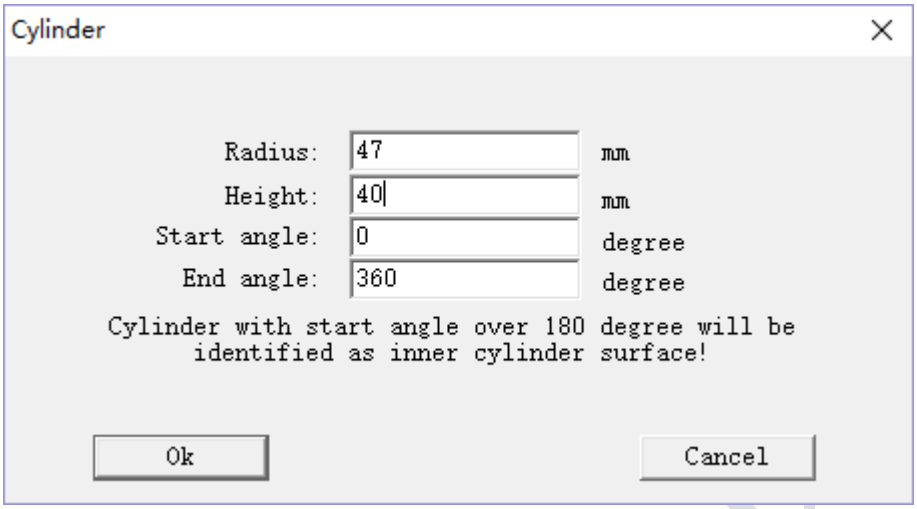
After you select the text, you can modify the properties and content of the text, you should click “Apply” button after modification, see below pic 2-3-3



Pic 2-3-3 Text properties dialog box

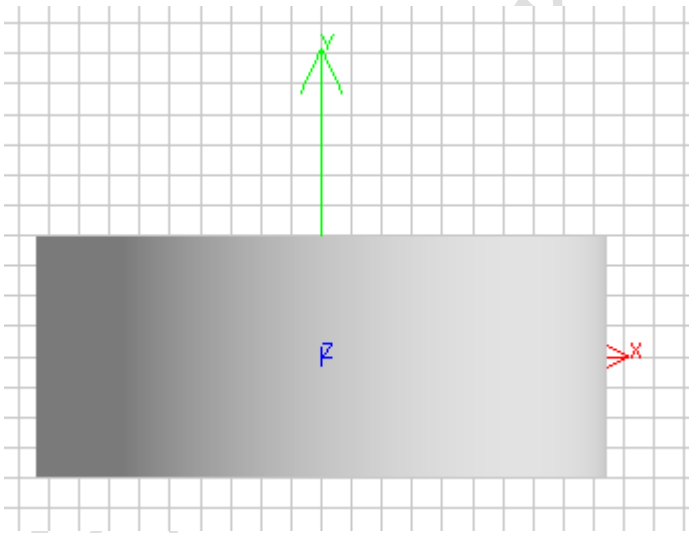
Build Model

Select the text object “feeltek”, click button, build a cylinder model, please see below pic 2-3-4 for parameters:



Pic 2-3-4 Cylinder model parameters

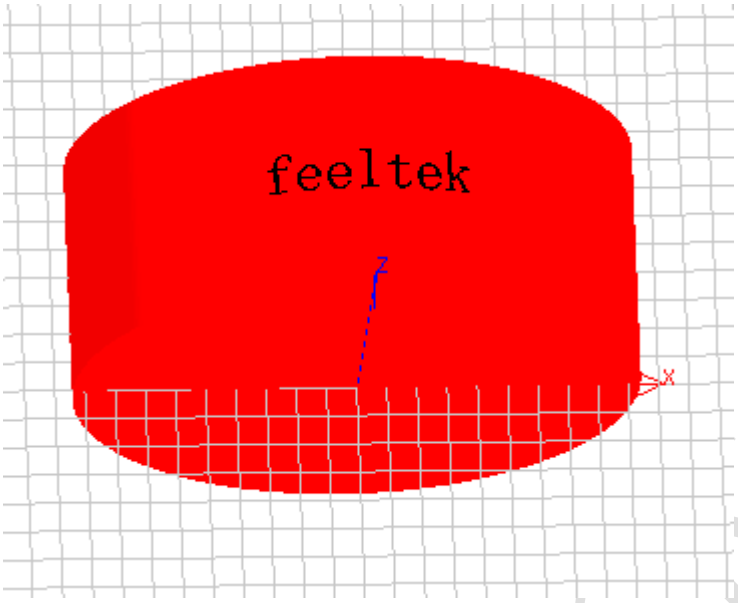
Click “OK” button, the drawing area interface is as follows



Pic 2-3-5 Cylinder model

Map

Click button, single click the cylinder, it will turn to red, click button, the interface is as follows:



Pic2-3-6 Map effect

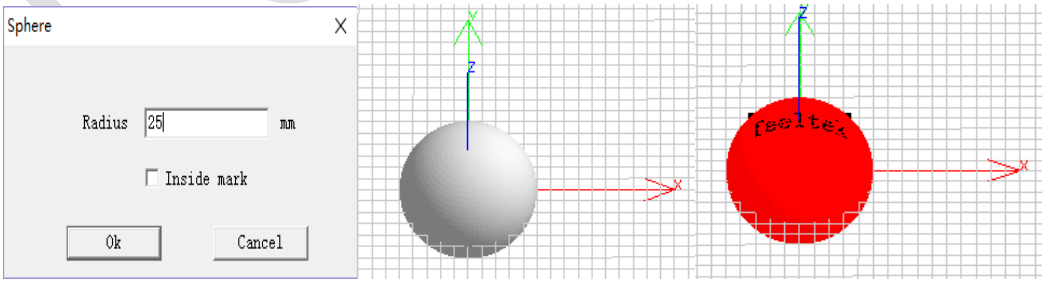
Note: The map must be placed in the model to the map part of the z coordinates of 0 planes above.

2.4 Model Z axis position coordinates settings

Here you should pay attention, we use the XY plane as the reference surface of the work piece. For example, the focal length of 300 field is 360mm, and it should always keep the Z axis coordinates of 0 layer as a 360mm focal length surface, the setting of text or height of map can not be higher than the software limitation of 420mm. (Due to the different processing range, the limitation of Z axis will be different.)

Operation Tips:

1. For the model that the height of Z to 0 plane is less than or equal to 60mm in the software, the effect is as follows:

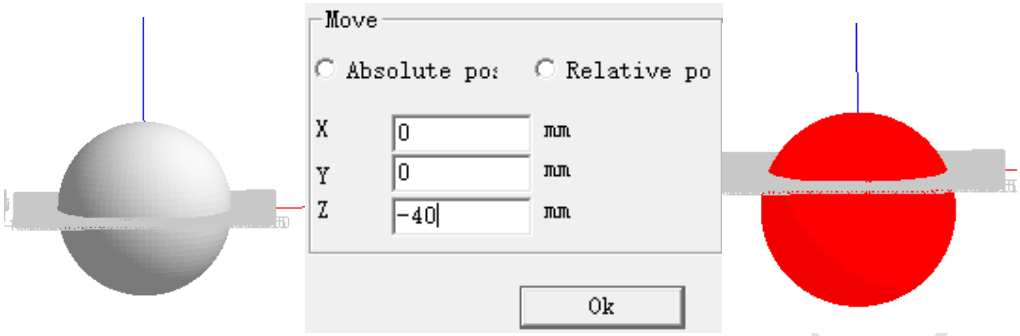


Pic 2-4-1 <60 effect

After mapping, adjust the vertical distance from the bottom of marking header to Z to 0 planes to 36mm focal length, then it can be automatically matched for 3D marking.

For the model that the height of Z to 0 plane is more than or equal to 60mm in the software, it can modify the Z coordinates, move the model to the negative direction of Z axis. For example: The model radius is 100mm ball, so the model Z axis position moves -40mm, adjusting the distance to the workbench under the marking head is 560mm. (The bottom of

marking head to Z to 0 layer is 420mm focal length), then it can be automatically matched for 3D marking.

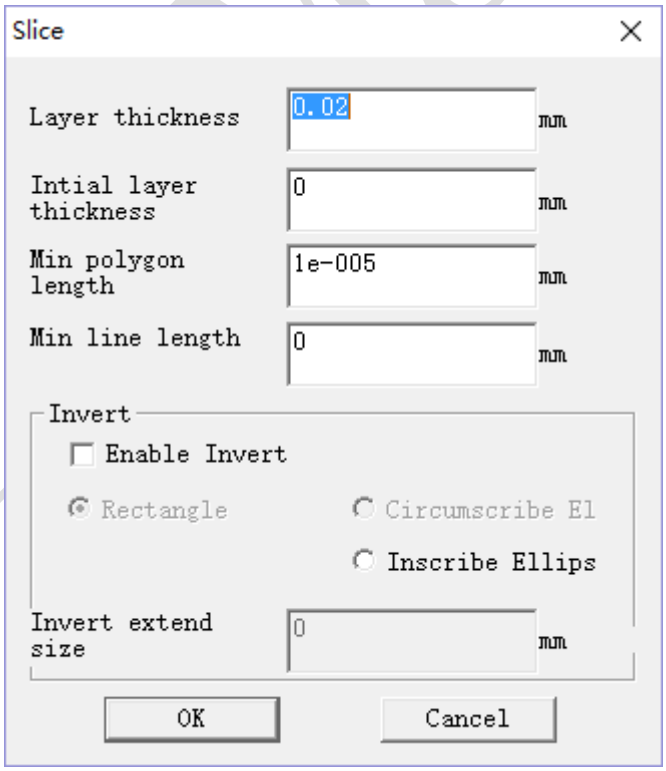


Pic2-4-2. >60 effect

3. Relief Processing

3.1 Model slice

1. After importing STL model, click the model and single click button, pop up dialog box pic3-1-1



Pic 3-1-1 Slice setting dialog box

Parameters instructions:

Layer thickness: model slice layer thickness

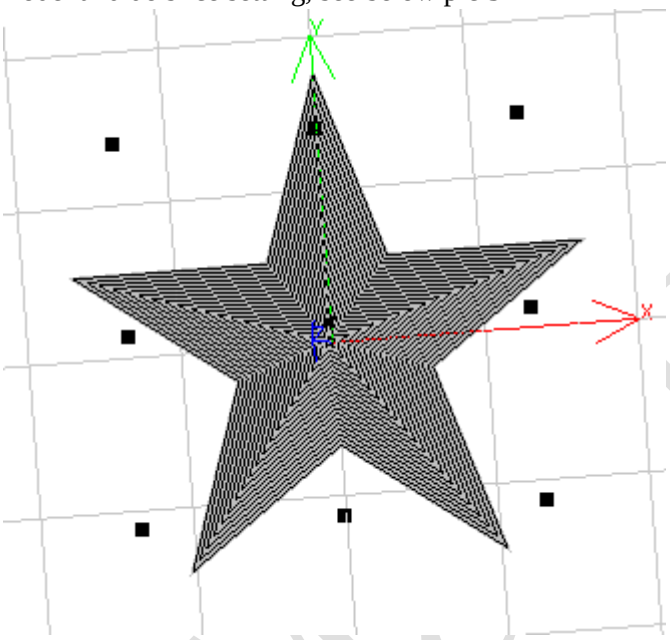
Initial offset: Ignore the thickness value at the top of the model

Minimum polygon length: Ignore the polygon that contour perimeter value is less than the number

Line accuracy: Line curvature precision, default value 0 is the highest precision.

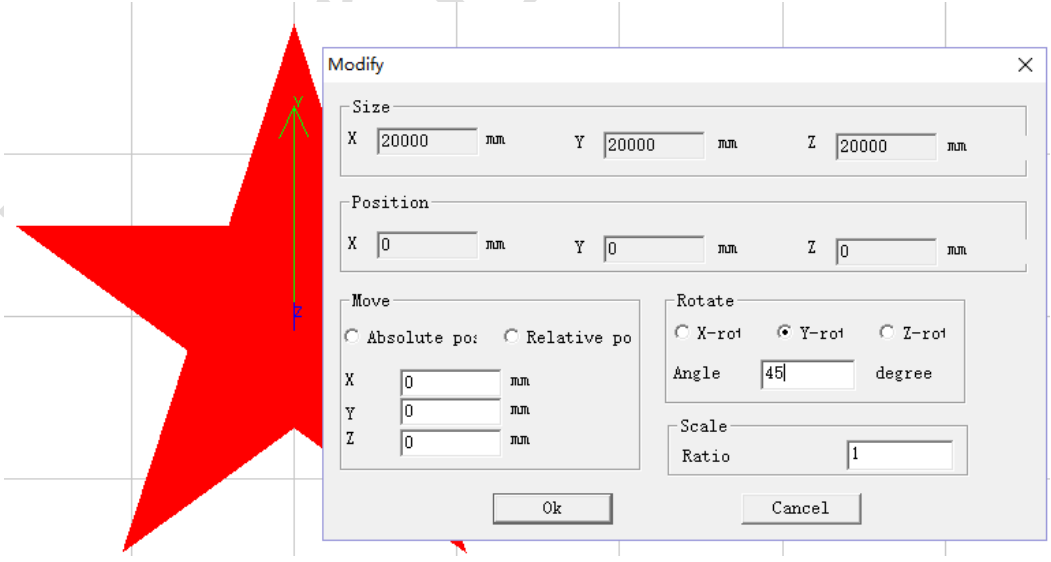
Anti mold parameter please refer to 3.4

Example: import .stl model and do slice setting, see below pic 3-1-2



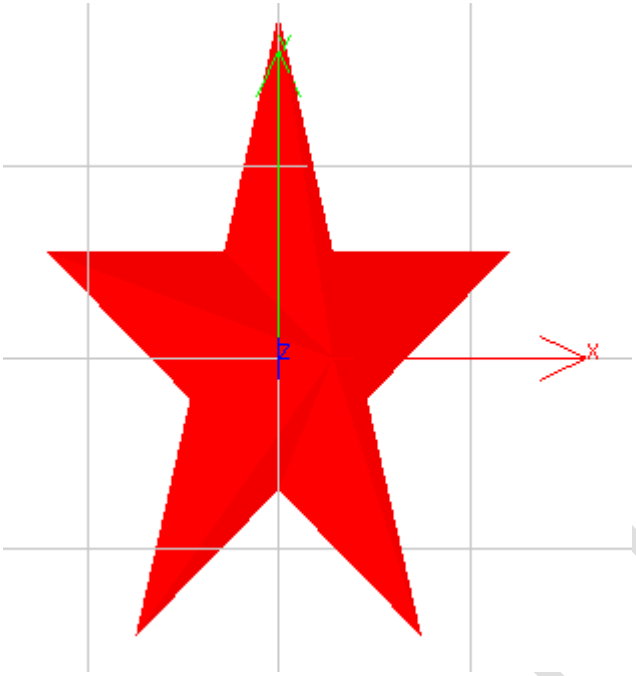
Pic 3-1-2 Slice effect

2. Single click button and select the model from the 3D edition menu, the model will turn to red lights, then single click move, rotate, zoom the menu button, pop up the follow dialog box 3-1-3



Pic 3-1-3 move, rotate, zoom dialog box

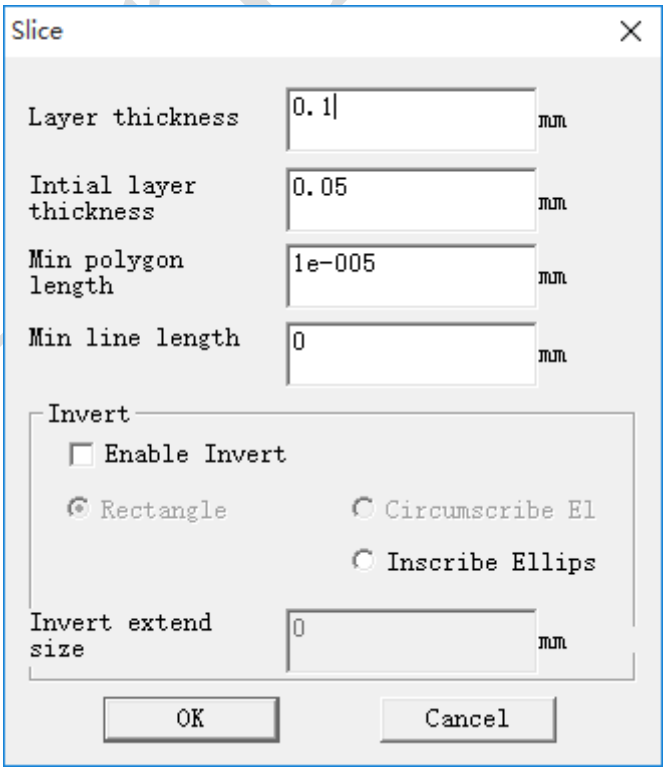
Make the model rotate 45 degrees around the Y axis, then see below pic3-1-4



Pic 3-1-4 rotate effect

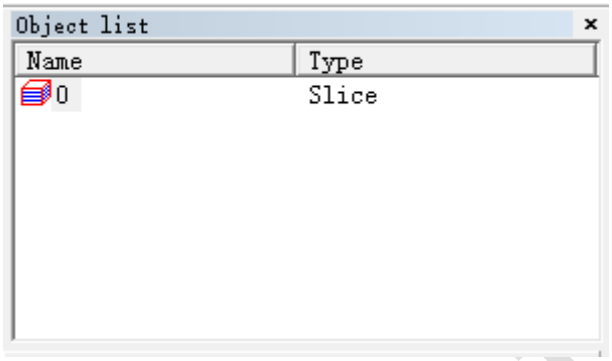
3. Then single click  tool from the 3D edition menu, set the model x0y plane centered of the x0y plane.

4. Click  from3D edition menu, set the slice parameter in the pop-up dialog box, see pic3-1-5



Pic 3-1-5 Slice setting interface

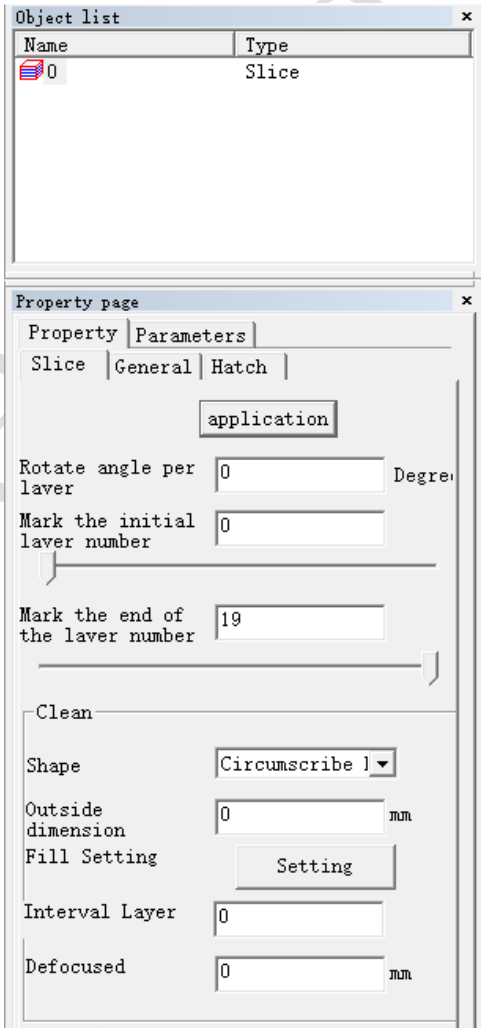
Currently the slice thickness of menu setting is 0.1mm. Initial offset is 0mm, other parameters are default. Click “OK” and will come out a slice object on the right side of object list. See below pic 3-1-6



Pic 3-1-6 Slice object

3.2 Slice object settings

1. Single click the slice object in the object list and set its proprieties. See below 3-1-1



Pic 3-2-1 Slice setting interface

Parameters instructions:

Layer rotate angle: default is 0°

(current set to fill at 0 degrees, which means each layer filling angle difference of 0 degrees value)

Mark initial, ending layer number: 0-20

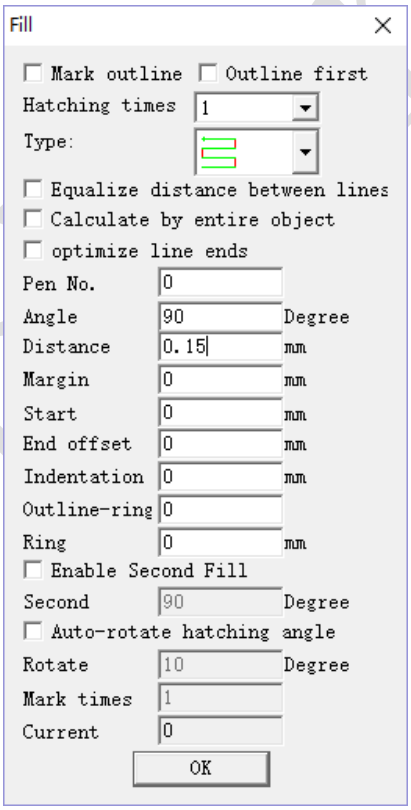
Because of the thickness of the model is 2mm, according to the 0.1 layers of thick slices, it can get a total of 21 slices (more than a layer of surface), thus initiating the layer number, the end of 0 and 20 in the default layer number, if the initial layer number in numerical between the two, then select from the middle part of the work.

Cleaning function: In the process of processing, due to the oxidation of the surface, the work piece needs to be cleaned (normally used in metal processing)

Border type: default rectangle fill

External dimension: default 0mm

Fill settings: single click button, pop up the menu and place the cleaning function fill, see below pic3-2-1



Pic 3-2-2 Cleaning fill dialog box

Currently the cleaning use two-way sweep 90 degree filling, filling line spacing 0.15mm, filling pen number is No.1. Click “OK” button to save.

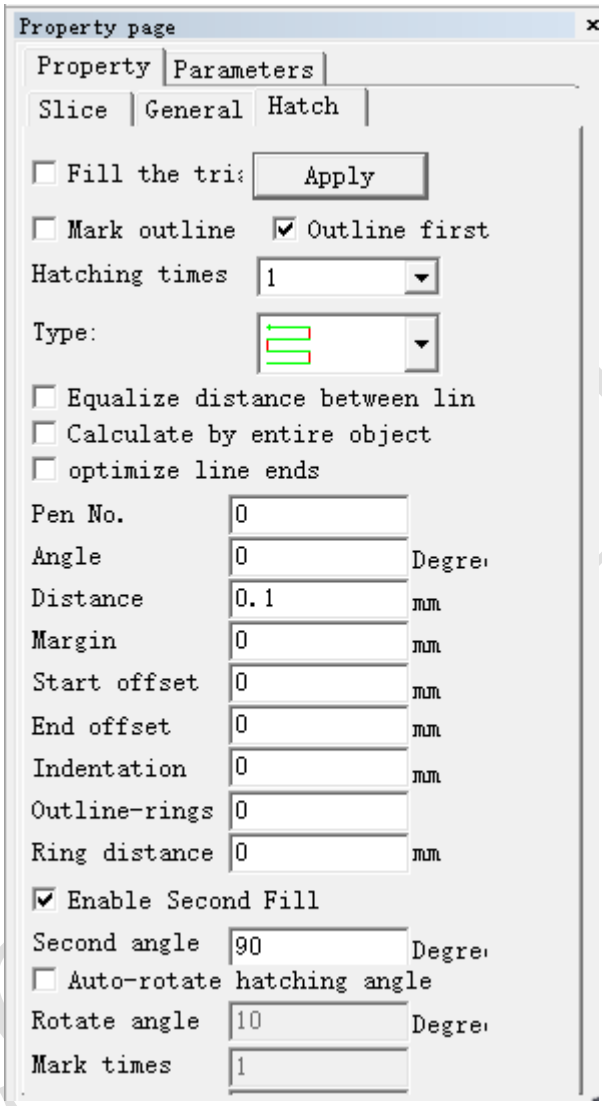
Interval layer: default is 0. Insert cleaning process in accord with the layer number. (For example: input 1 means after each slice process, it will be inserted to the cleaning process)

Defocus: the defocus value set when do cleaning process.

Finally please click “Apply” button to make it effective.

3.3 Slice fill settings

Single click fill column in the slice proprieties and do the setting, see below pic 3-3-1



Pic 3-3-1 Slice fill setting

Parameters instructions:

Triangle filling: it can be fill directly after import the STL format object.

Enable contour: Indicates whether the outline of the original image is marked

First outline: Indicates that in the case of the contour of the first marking the contour line again marking the fill line; If unchecked, the default first marks the fill line and then the contour line

Filling times: the number of objects that can be filled

Filling type:

Filling cancel: cancel current filling

One-way filling: the filling line is always from left to right to fill

Two-way filling: the filling line will firstly from left to right to fill, then from right to left to fill, and follow this cycle.

Optimization for two-way filling: it is similar to two-way filling, However, a line will be formed between the ends of the filling line

Back filling: The fill line is the object contour and is shifted from the outside to the inside

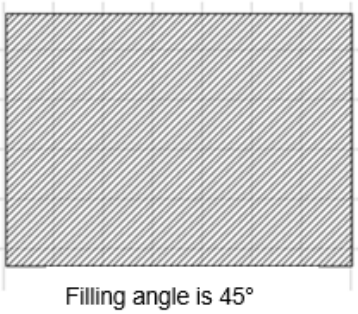
Uniform distribution line: To solve the problem of uneven distribution of filling line at the beginning and end of the filling object. Due to the size of the filling object and the setting of the filling line spacing, the phenomenon of uneven distribution of filling lines may occur at the beginning and the end of the filling object. In order to simplify the operation, it can also achieve the purpose of uniform distribution of all filling lines without the need to reset the line spacing. After selecting the item, the software will automatically adjust the filling line spacing on the basis of the user's fill line spacing;

Object integrated calculating: After the check, fill in the shape of the object, but not in the order of the object list column;

Snake filled precise border: select “snake filling”, select it and it can automatically increase contour

Filling pen number: 0-254 for selection

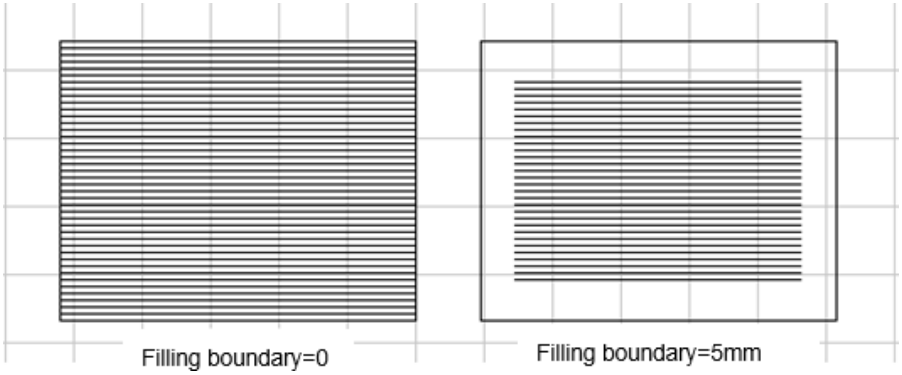
Angle: indicate the angle between filling line and X axis positive direction, see below effect pic3-3-2



Pic 3-3-2 Angel effect

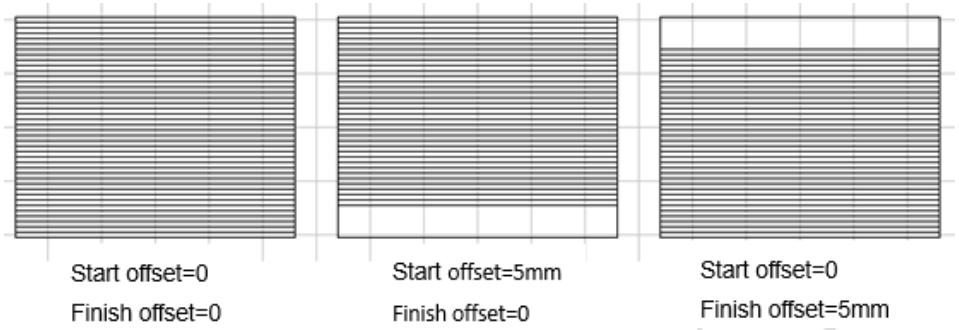
Line spacing: indicate the distance between adjacent filling line.

Margin: indicate the distance between filling line and object outlines, after parameters modification, see below effect pic 3-3-3



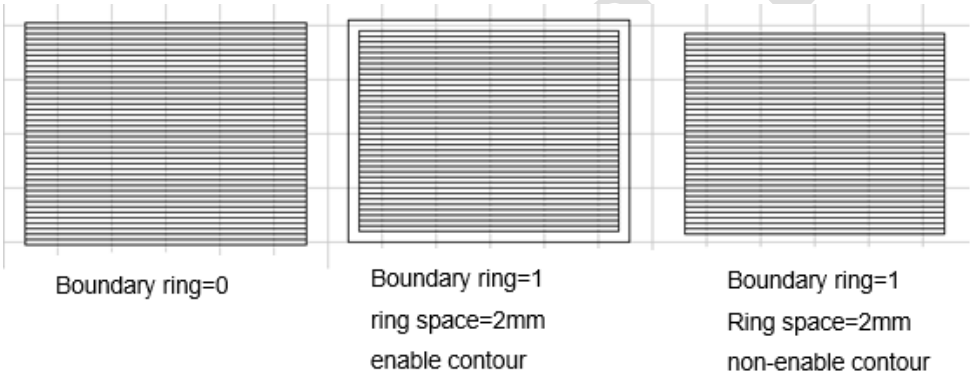
Pic3-3-3Margin effect

Start offset: indicate the distance between the first filling line and boundary
Finish offset: indicate the distance between the last filling line and boundary, see below effect pic 3-3-4



Pic 3-3-4 Start offset, finish offset effect

Linear indent: indicate indent at both ends of the filling line. If it is positive it is the amount of indentation, if it is negative, it is the amount of stretch
Boundary ring number: On the outer edge of the object, make several isometric edges, and then fill in the selected fill;
Ring spacing: the distance among rings when do backing filling, see below effect pic 3-3-5

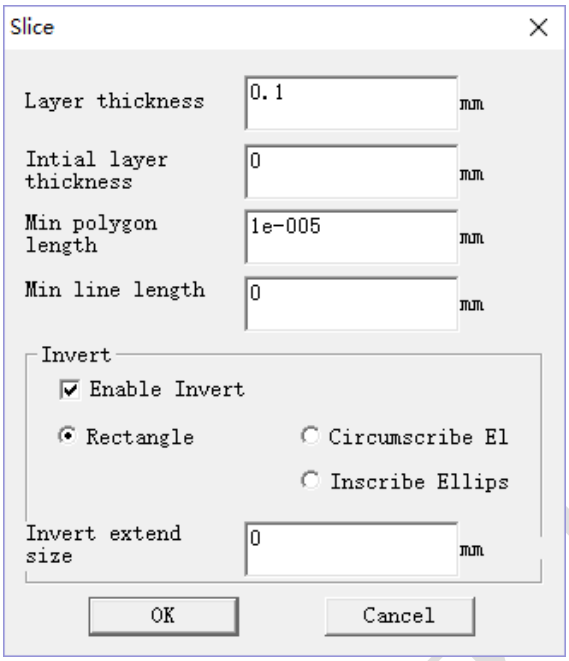


Pic 3-3-5 Boundary ring number, ring spacing effect

Check to make a second angle fill the object will be filled twice by the angle of the set.
After the automatic rotation filling angle is selected, the filling angle can be rotated automatically according to the set angle
Note: after parameter modification, click "Apply" button and make it effective.

3.4 Inverse model parameter settings

After importing the model, using the inverse model will come out a different result.
Operation step:
1. Import model and check whether the model Z direction is reversed. If the model Z direction is reversed, please rotate and make it in the center, for the detailed operation step, please refer to 2.6.1
2. Then do slice processing, select the "enable invert", see below pic 3-4-1



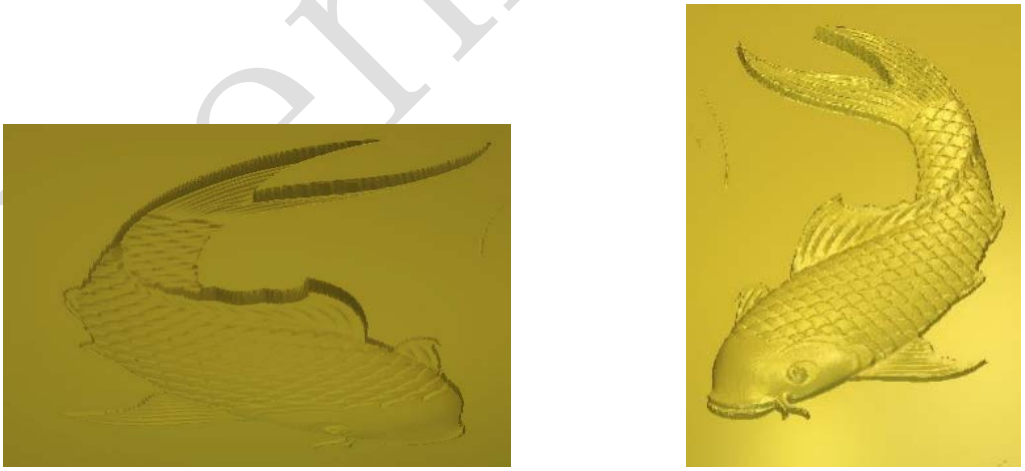
Pic 3-4-1 Slice inverse function

The external rectangle of the enabling tool is calculated according to the bottom contour area of the model, which is used to remove the material area outside the given model.

External expansion size defaults to 0, the size of the processing area will be expanded

In the example, it use external rectangle to do the slice processing, it can also use external ellipse and internal ellipse, according to actual model shape to select. Click “OK” button and make it effective, other parameters of slices can refer to 3.1-3.3 operation instruction.

Marking effect is as follows pic 3-4-2



Normal slice effect　　inverse slice effect

Pic 3-4-2 Marking effect