AKYAPAK CNC MANUAL

Version:3.1

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Ak300 and Ak400 CNC programs are controlling programs that developed by AKYAPAK. AK300 program is saving the steps of the bending which is made by the operator by manual. The program has the ability of the same bending which is saved in the memory before. AK300 can save up to 250 Steps. Configuration could be made after saving the steps. AK300 is learning the bending steps sequentially. During the learning it takes every movement as a new step. After finishing the movement of the axis program reads the info of the movement and saves it as a step in the memory.

AK400 CNC program is calculating the position of the axis of the material differently from AK300 program. Through those calculations the program allows us to bend the material easier. Program also calculating the axis coordinates of the parts which are difficult to bend as manual. After the necessary correction made on the program the part program can be used as automatic or serial bending.

AK300 program is separated into two main groups which are main axis and supporter axis. In the program only the main axis' position info is taken and saved to the program. Supporter axes are unnecessary in automatic bending and are not being saved by the program. Supporter axes are just being used in manual bending to support the main axis.

AK400 calculates only the left roll, right roll and rotation axis positions. Other axis information can be loaded from file adjustment menu by adjusting the program and the new axis entered manually. These axes can difference by the model of your machine.

AK300 and AK400 could be found in options of 3 axes, 5 axes and 6 axes. Introduction manual is prepared for the 6 axis model. If the machine that you are using is lower than 6 axes you should ignore the upper models explanations. You can find the axis explanation below;

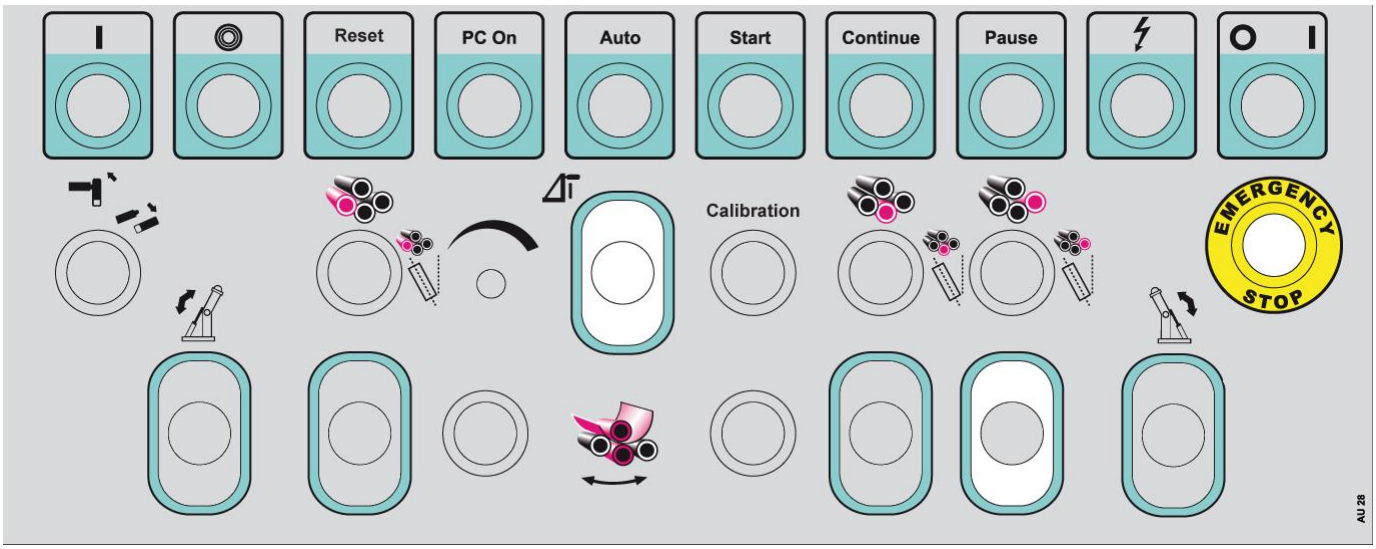
Main Axis

On a machine with 3 axes: Left roll, right roll and rotation.
On a machine with 5 axes: Left roll, right roll, right side supporter, left side supporter and rotation.
On a machine with 6 axes: Left roll, right roll, right side supporter, right side supporter, central supporter and rotation.

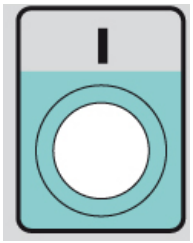
Supporter Axis

Conic values : Left roll, Right roll and bottom roll

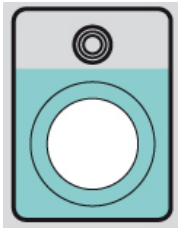
Console of AK300 Machine



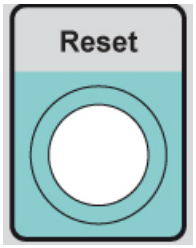
İn AK300 control system console is showen above. Buttons which on the console help to use machine. Explanations of buttons are given below:



To give a start to hydraulic motor.

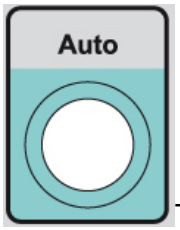


To stop a hydraulic motor.



Resset to emergency stop module

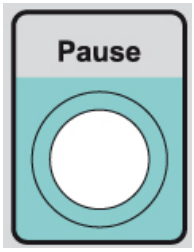
To start and stop computer of machine.



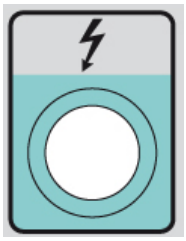
To start automatic working mode of machine.

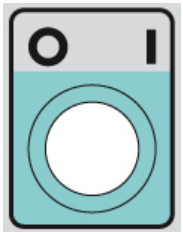
To start a substantial program. İn order that program may work, ‘’AUTO’’ button must be active at the same time.

To continue a program after accommodate a material in machine.

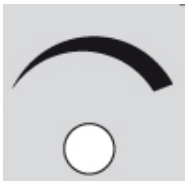


To stop a program temporarily. Press a buton again and program will continue to work

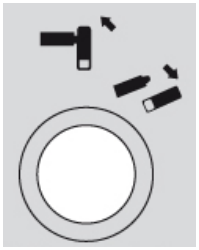

To show that the machine have energy.



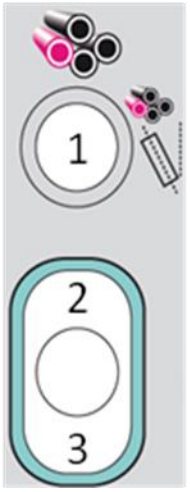
İn order that the machine may work key must be get in position ‘’1’’. This key using for security. When machine break down, the key should get ‘’0’’ position, so it avoid to start machine by someone else.



To choose working speed of machine.



Open and close button of drop end. To open a drop end, bottom roll must be in lower position, it is essential condition. İf bottom roll is not in lower position, the drop end cant open. To close the drop end, top roll must be in lower position.



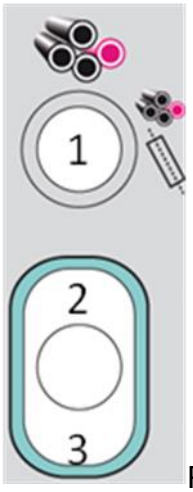
Left roll motions exist in this section. İf number ‘’1’’ key is active, left roll can open and close for cone position. İf passive than left roll can move up and down.

Left Roll Cone Opening: Number ‘’1’’ key is active, when press number ‘’2’’ button the left roll opens for cone position.

Left Roll Cone Closing: Number ‘’1’’ key is active, when press number ‘’3’’ button the left roll close cone position.

Left Roll Up Movement: Number ‘’1’’ key passive, when press number ‘’2’’ button the left roll move up.

Left Roll Down Movement: Number ‘’1’’ key passive, when press number ‘’3’’ button the left roll move down.

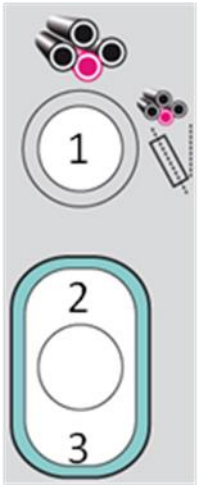


Right roll motions exist in this section. İf number ‘’1’’ key is active, right roll can open and close for cone position. İf passive than right roll can move up and down.

Right Roll Cone Opening: Number ‘’1’’ key is active, when press number ‘’2’’ button the right roll opens for cone position.
Right Roll Cone Closing: Number ‘’1’’ key is active, when press number ‘’3’’ button the right roll close cone position.

Right Roll Up Movement: Number ‘’1’’ key passive, when press number ‘’2’’ button the right roll move up.

Right Roll Down Movement: Number ‘’1’’ key passive, when press number ‘’3’’ button the right roll move down.



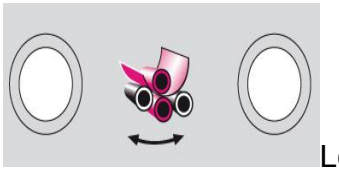
Bottom roll motions exist in this section. İf number ‘’1’’ key is active, bottom roll can open and close for cone position. İf passive than bottom roll can move up and down.

Bottom Roll Cone Opening: Number ‘’1’’ key is active, when press number ‘’2’’ button the left roll opens for cone position.

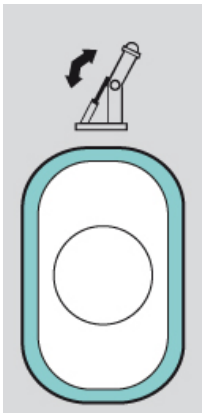
Bottom Roll Cone Closing: Number ‘’1’’ key is active, when press number ‘’3’’ button the left roll close cone position.

Bottom Roll Up Movement: Number ‘’1’’ key passive, when press number ‘’2’’ button the left roll move up. Also pressing pressure must be adjust well. Pressing pressure can adjust using manometer which exist in front of machine.

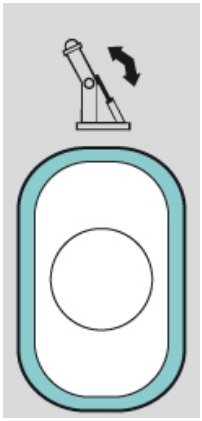
Bottom Roll Down Movement: Number ‘’1’’ key passive, when press number ‘’3’’ button the left roll move down.



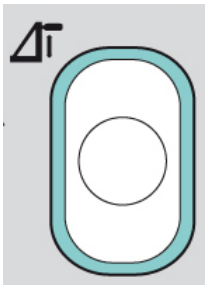
Left and Right Rotation Buttons:



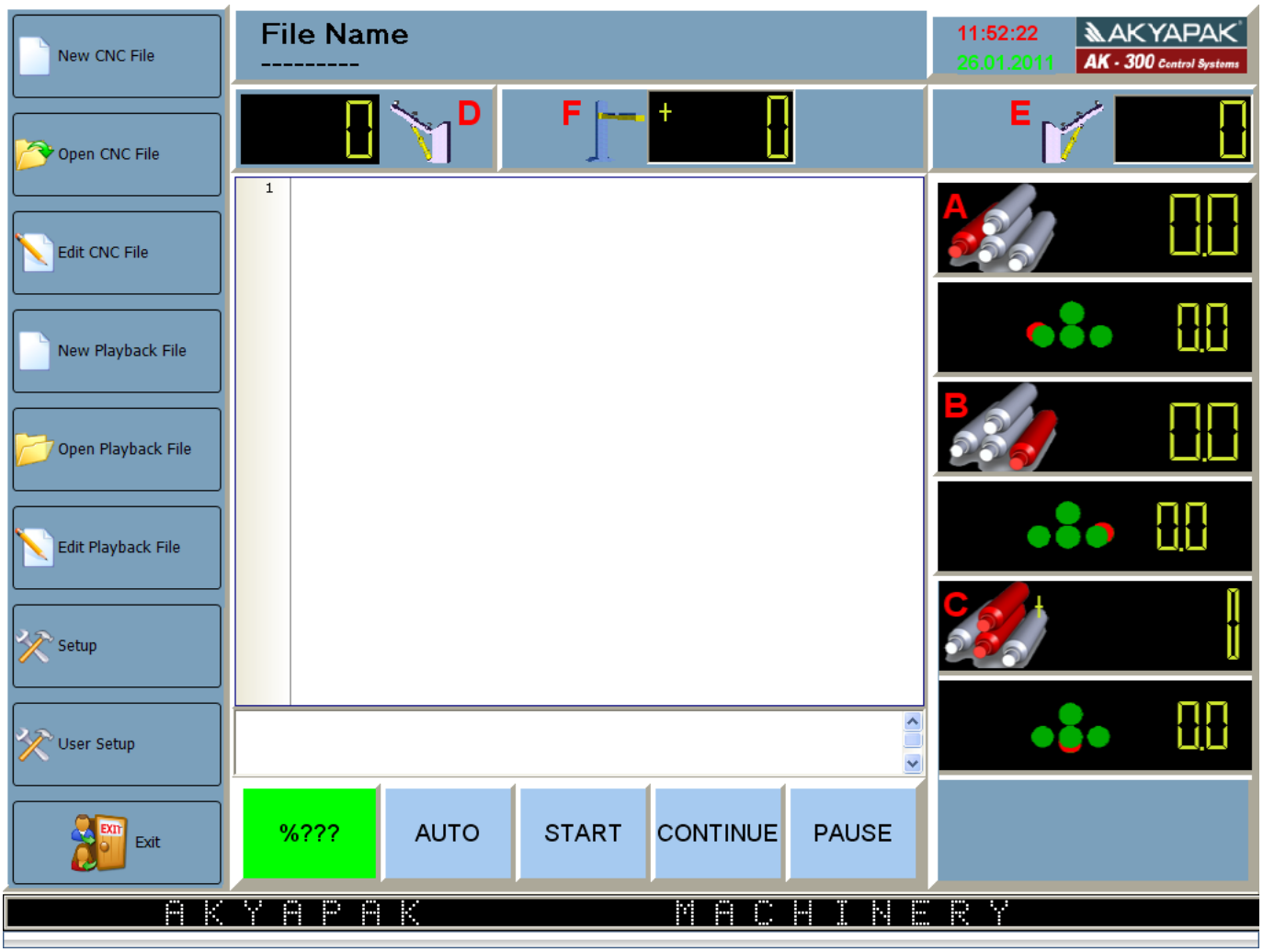
Up and down movements of left supporter



Up and down movements of right supporter.



Up and down movements of central supporter.



Above picture show main menu of AK300 program. Section of indicators exist on main windows. Section of program steps, user operations.

İnformation of axis positions:

Main axis :

Picture shows left roll axis position. Left roll is showen by letter ‘’A’’ as axis name in Ak300 program.

Picture shows righ roll axis position. Right roll is showen by letter ‘’B’’ as axis name in Ak300 program

Picture shows position of rotation axis. Movement axis is shown by letter ‘’C’’ in AK300 program.

Picture shows position of left supporter axis. Left supporter is shown by letter ‘’D’’ as axis name in AK300 program.

Picture shows position of right supporter axis. Right supporter is shown by letter ‘’E’’ as axis name in AK300 program.

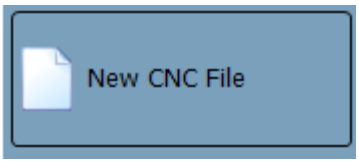
Picture shows position of central supporter axis. Central supporter is shown by letter ‘’F’’ as axis name in AK300 program.

Auxilliary axises:
Auxilliary axises don’t work in automatic mode. Only use to help bending in manual mode. Auxilliary axises are pretty beneficial for cone bending.

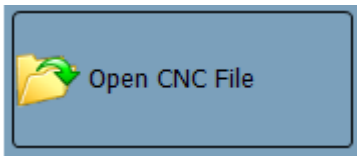
Left roll cone value

Right roll cone value

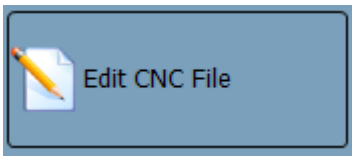
Bottom roll cone value



New CNC File: To create a new CNC file.



Open CNC File: To open a CNC file already exist in the memory.



Editing CNC File: To edit or revise the CNC file already created.

New NC File: To create new bending datas.

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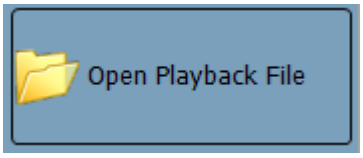
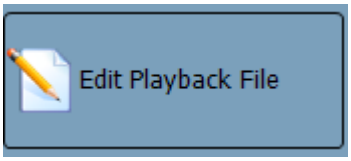
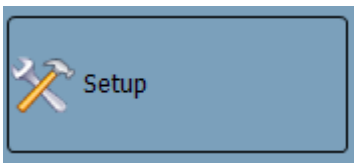


Open NC File: To call back a previously saved file.

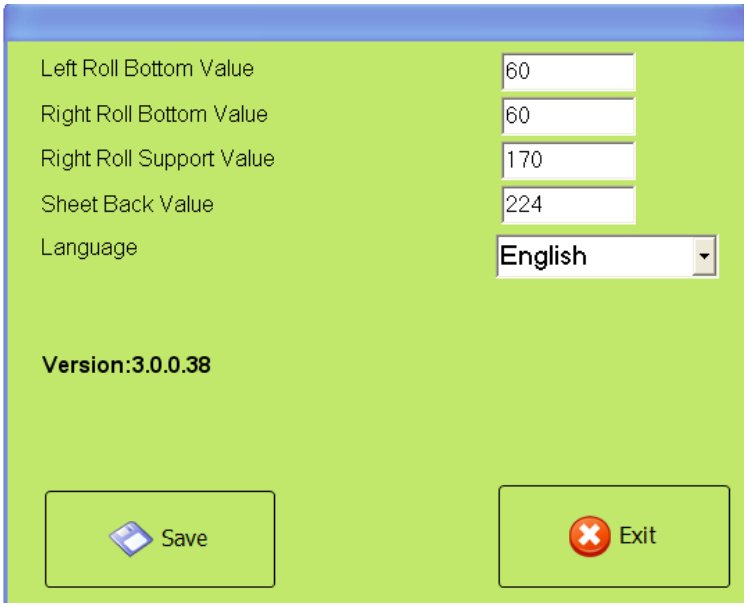


Edit NC File: To change or correct the created and saved files.



Machine Setup: Only for use of authorized service. Password required. Please do not try to change the setup options.

User Setup: To enter your bending values for the machine. The menu below could be found under the user setup menu



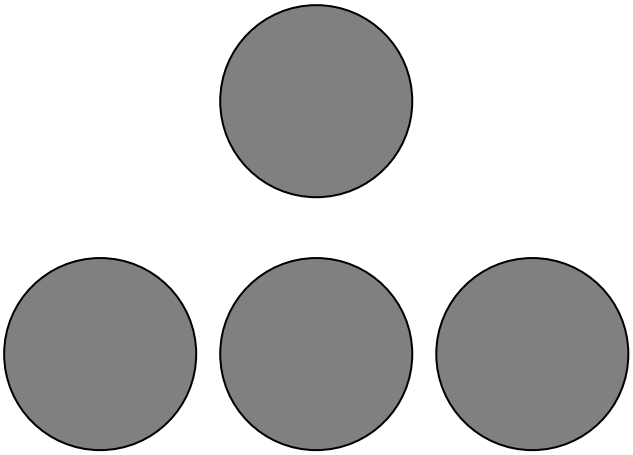
Minimum value of the left roll: Defines the minimum value of the left roll.

Maximum value of the right roll: Defines the maximum value of the right roll.

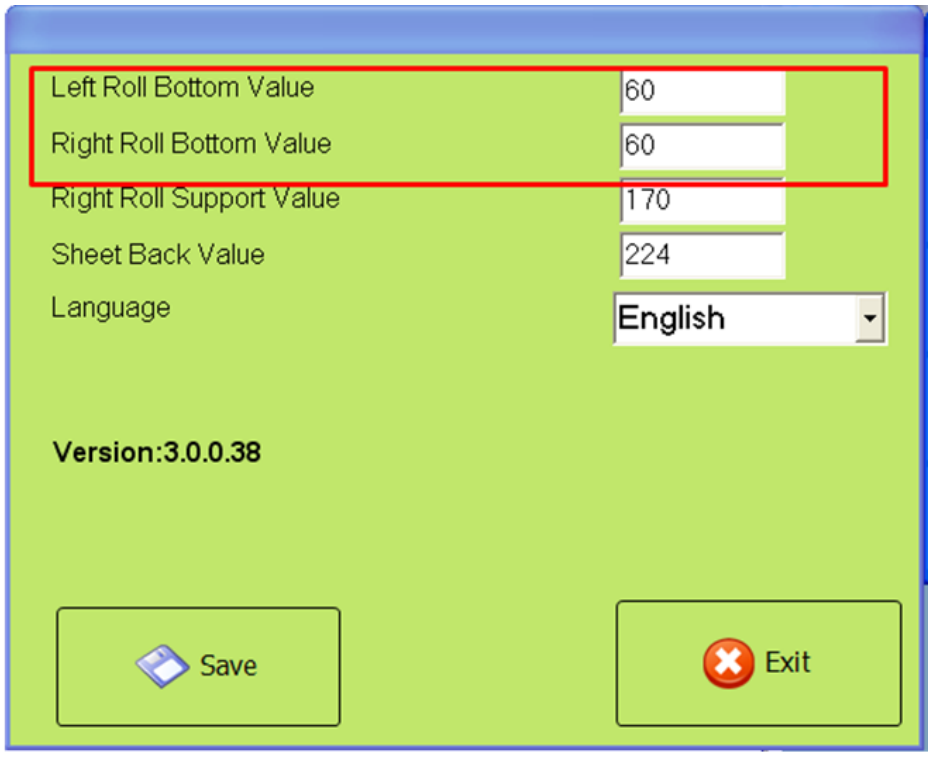
Supporter value: Defines the supporter value of the roll for material feed according to NC-Processing.
Pull Back Value of the Material: Defines the pull back value of the material towards the axis during the material feeding process.

SETUP OF THE PARAMETERS :

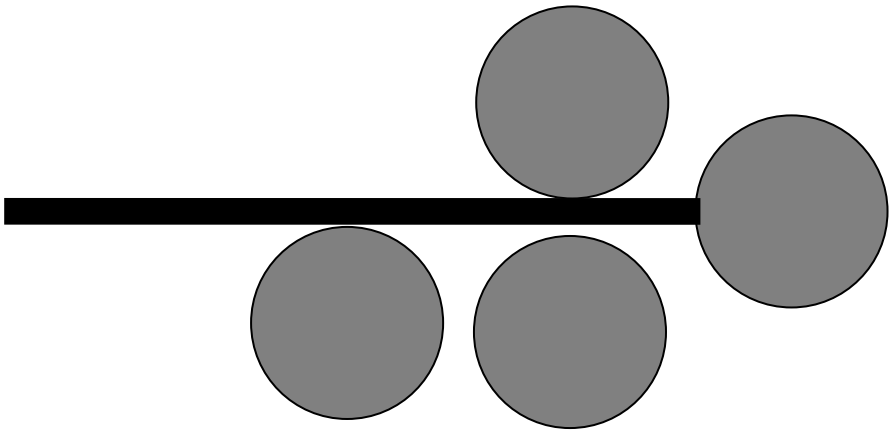
1-) Setup of the parameters of the left and the right roll value :



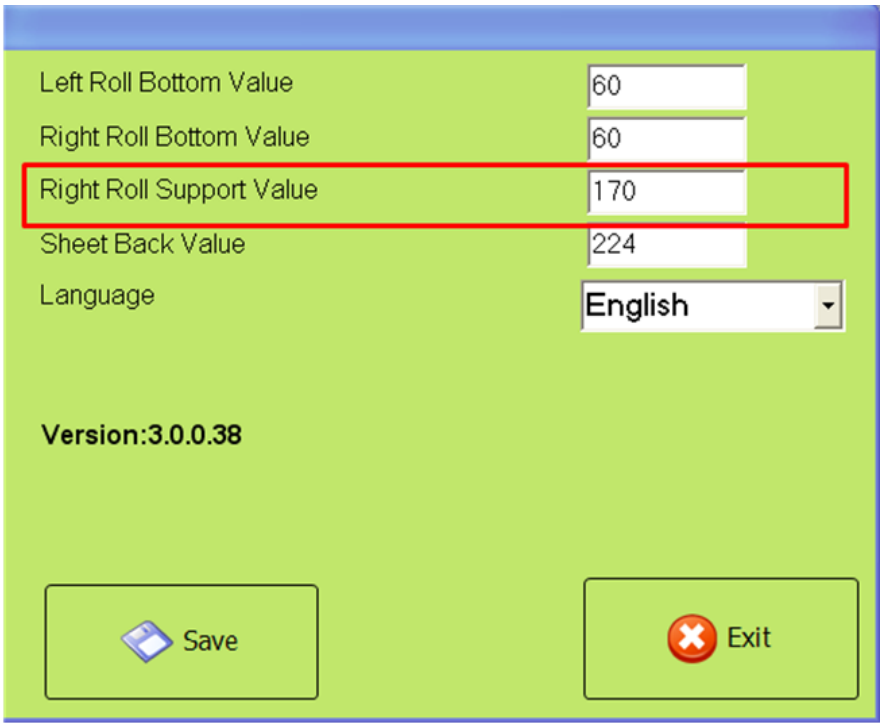
Pinch the left and the right roll to a point where the material cannot be bend and define a minimum value for the material to be bended. Enter then on the user setup menu these minimum values of the left and right roll.



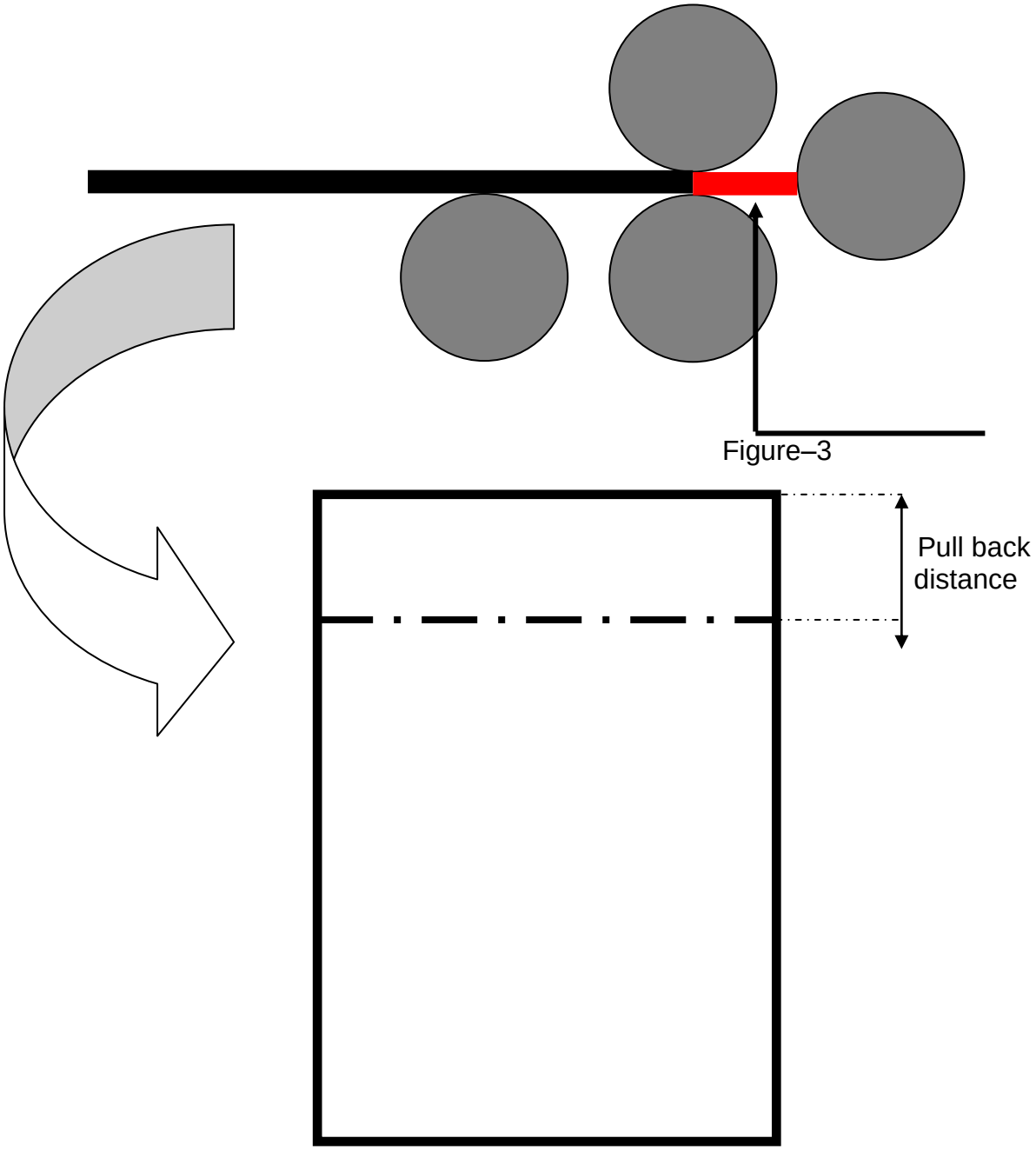
2-) Setup of the Locator Values :



Leave the right roll on its locator value and feed the material between the upper and lower rolls. The lower roll will not be pinched. Locate the right roll so that the material reaches the axis of the roll. After completing this process, enter the value to be seen on the monitor as the locator value.



3-) The pull back adjustment of the material :



Figure–3

Feed the material parallel to the right roll and move the lower roll then upwards in order to pinch the material. After the pinching process, exclude the material from the machine. You will see a slightly mark on it. Measure the distance from the material end up to this mark and enter the dimension you will find as the pull back value.

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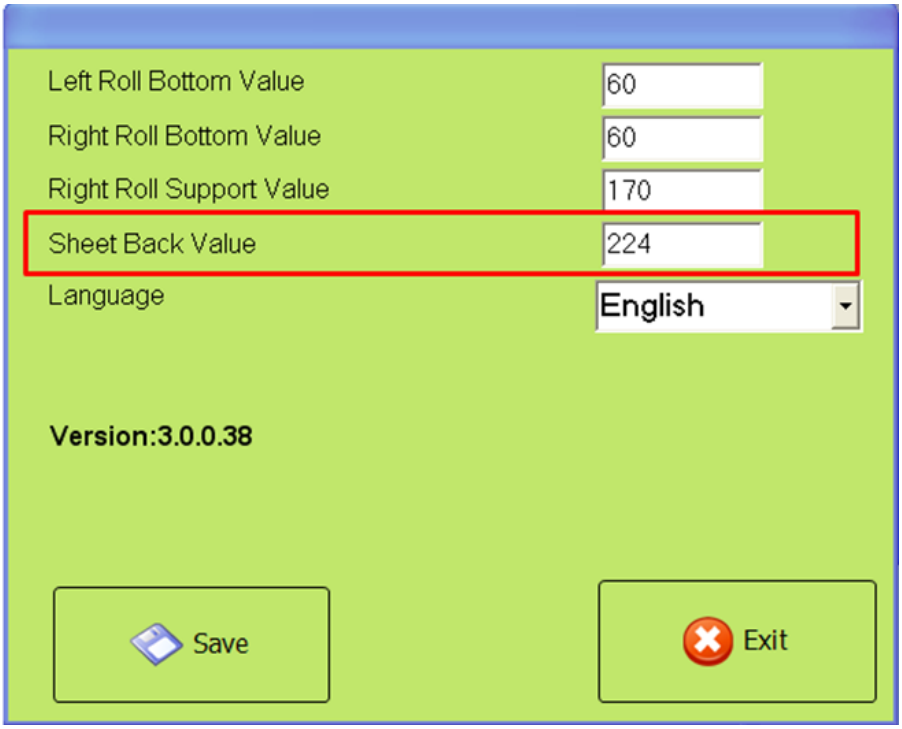


Language Setup: You can change the language within this menu.

After the setup of the material feed parameters touch the save button in order to save your changes.

Exit: Through this button you will exit the user setup menu.

By touching this button you will exit the NC program and turn back to Windows.

Programming a new Playback

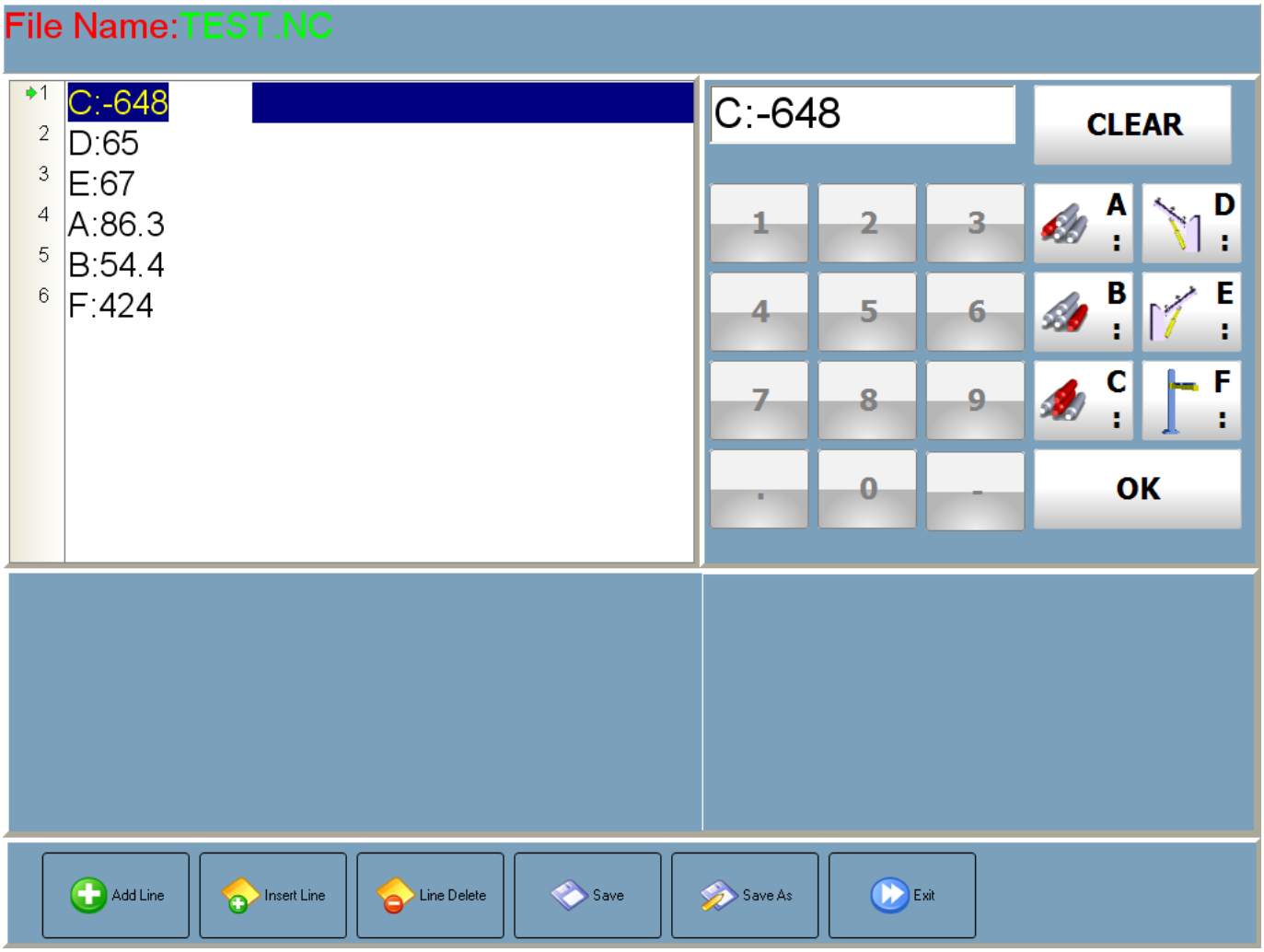
In order to program a new playback, touch the AUTO-button and be ensured that the AUTO-button is activated. After the activation of the “NEW PLAYBACK”-button, pres on this to open the virtual keyboard. Name the new bending process and confirm it with OK-button. The machine will position itself to the material feeding operation. Just after that the buzzer starts to beep. This is the signal for starting to feed the material and pinching the lower roll. Afterwards touch the “CONTINUE”-button. Just after the buzzer stops beeping, the material will be brought to the reference point. From this point on, every step will be recorded and saved by the NC-Programm. So it goes: Just after the Rolling to the left or right is completed, the relaving values of the left and right roll and the movement will be entered into the proceeding cell. Pres then on “RECORD END”-button in order to save the process automatically.

Editing Saved NC-Files :

Press the “Open NC-File”-button on the control screen. Select the bending process, you would like bend automatically and touch the “LOAD” button. Ensure that the “AUTO”-button is activated. If not, please activate this button and pres then the “START” button. The left and the right roll will locate themselves into the material feeding position. You will hear the beep signal now. This means you prompt have to feed the material and pinch the lower roll. Touch finally the CONTINUE-button.

Change or Correction of the Saved NC-Files:

Touch the “Edit NC-File”-button on the control screen and select the file you would like to change or correct. The following screen appears:

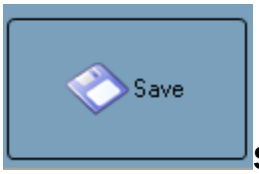


Touch the stage of the step that you want to change or correct. Touch ‘’CLEAR’’ button and enter axis name that you would like to change or correct, then using numerical keyboard enter axis positions and finnaly touch ‘’OK’’ buton to end process.

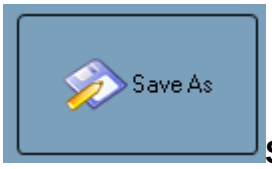
Add Line : Press to add a new line to your file

Add Sub-line: Press to add a sub-line to your file

Delete Line: Press to delete the choose line.

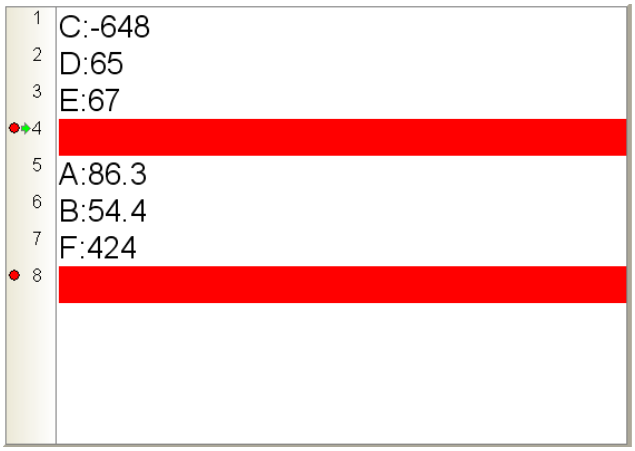


Save: Press to save the changes or the corrections.



Save As: Press to save the corrections or changes with under a different name.

''Save'' and **''Save As''** during these process pay attention that there is no empty lines in program. İf there is an empty line the program will not make any record operation. Empty lines are showen by red color and it means there is error. To make record operation don't leave an empty lines.



4. and 5. steps have left empty therefor lines are red and there are error.

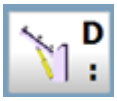
Exit: Press to exit the file editing menu.

Adding axis and explanation of symbol.

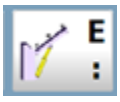
To add left roll axis.

To add right roll axis.

To add rotation axis.



To add left supporter axis.



To add right roll axis.

To add Central supperter axis.

CNC PROGRAMMING

The machines produced by Akyapak are using the bending program which is also developed by Akyapak. Program named as AK400 by Akyapak Machinery Company.

AK400 CNC program is calculating the position of the axis of the material differently from AK300 program. Bending calculation is just made for the left roll, right roll and rotation roll.

While calculating Ak400 program just takes into consideration of ratio of the radius. While programming all the measurements must be given according to outer radius. Programming can be made; rotation, radius, angle of the radius and length of the radius.

These are indicated as below;
Rotation: Indicated with the letter “L”
Radius: Indicated with the letter “R”
Radius Angle: Indicated with the letter “A”
Length of radius curve: Indicated with the letter “S”

Rotation: Indicated with the letter “L”. Here are the material steps ahead without any bending. When L500 written the material steps ahead for 500mm long without any bending. In this section, left and right rolls don’t press the material. In order to move the material without any bending left and right rolls take necessary parameters from minimum value of the left and right roll. While configuring these parameters, the user must very careful for the values of the thickness of the material when programming.

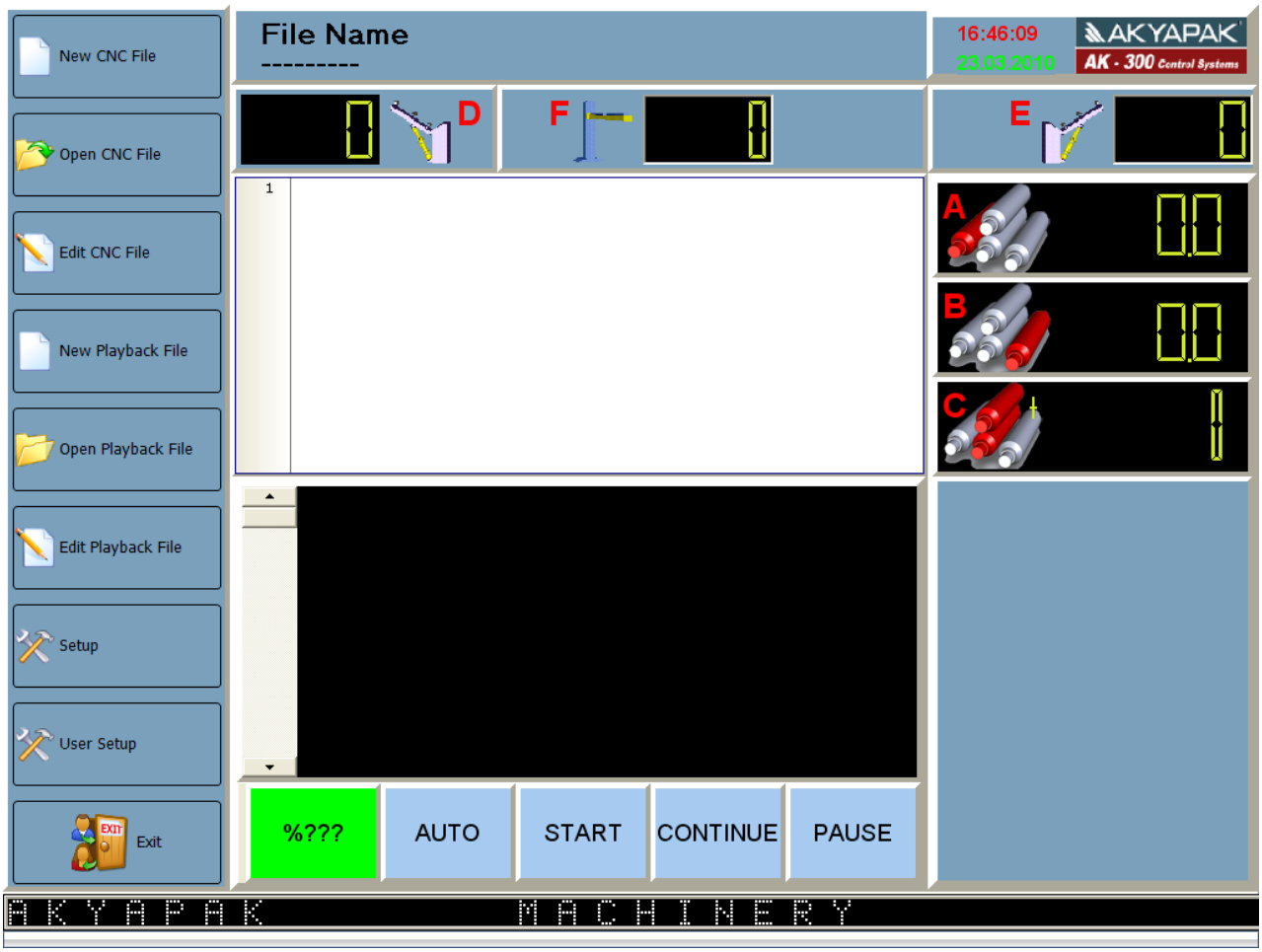
Radius: Indicated with the letter “R”. Necessary value for bending and outer radius must be entered every time. R500 means the material has 500mm outer radius. The most important is following steps which are;

Radius Angle: Indicated with the letter “A”. The numerical value after the letter A is the value of the radius angel to be bended. For example; A180 refers to 180 degree bending.
R500A180 means; Radius value is 500 and radius angle is 180 degree.

Length of the radius curve: Indicated with the letter “S”. The numerical value after the letter S is the value of the Length of the radius curve to be bended. For example; S1570 refers to 1570mm radius curve length.
R500S1570 means; Radius value is 500 and the length of radius curve is 1570mm.

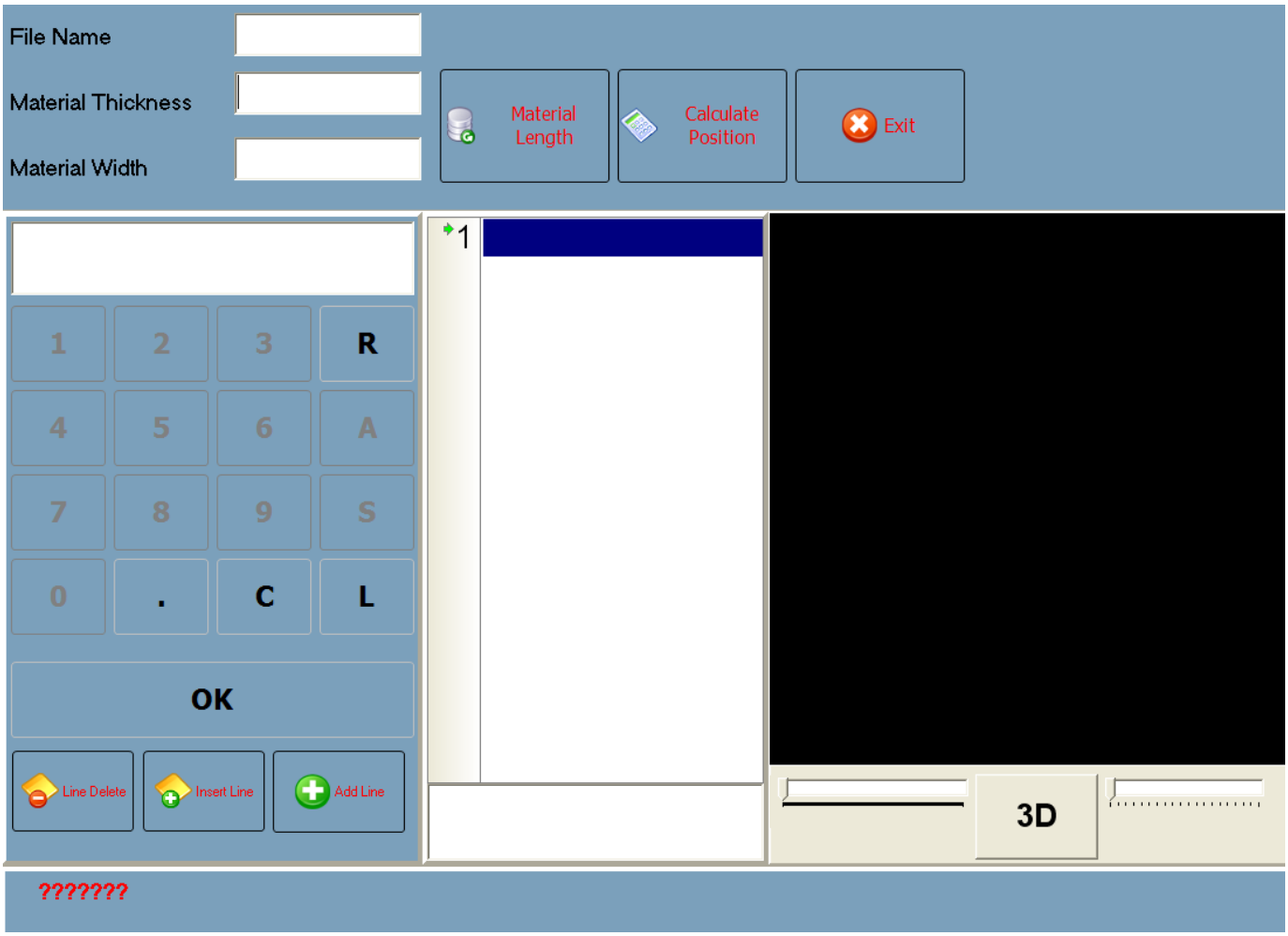
A Sample programming

In order to bend a circle which has a 500mm radius the steps must be taken as below;



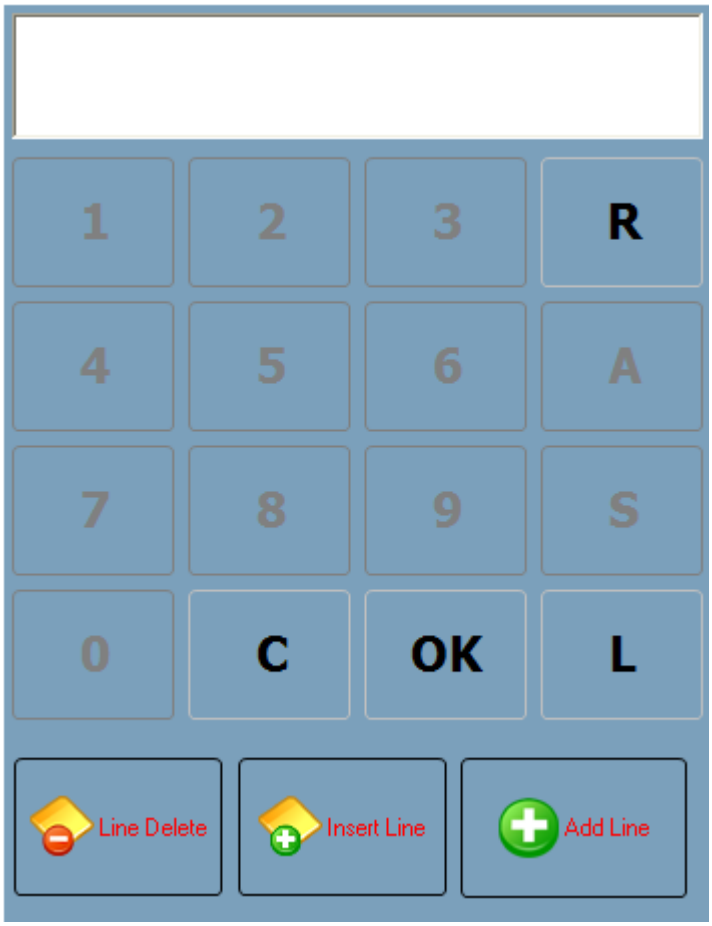
Touch the “New CNC File” icon on the main window. After you touch the screen the programming screen will appear. On this screen you enter the values of the bending and also you can check the correctness of the values. You can find a view of programming screen below. Making CNC file is to be composed of three parts.

Those are; entering the program values, creating the program lines and simulation of the program.



File Name: The name of the program of the part to be bended.

Material Thickness: The material thickness of the part to be bended.



Command Screen of the program : In this screen you can just see the numbers from 0 to 9 and the bending commands.

In the beginning all the numbers are inactive. In order to enter a number you must first enter bending letter. These are bending and proceed without bending. If your command starts with Radius value after that commands of A and S become active. If your command starts with L , A and S commands will not become active.

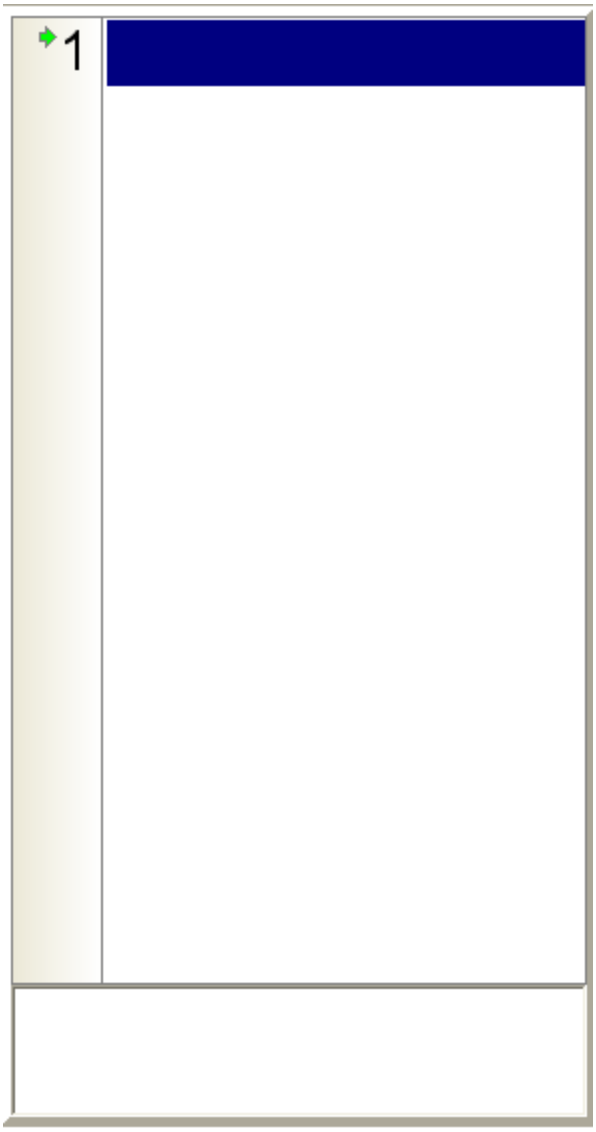
C symbol is for the clear command. This command generally is used while entering a number to the command line.

OK is for confirming the command that you enter. If there is no error on the command line that you enter OK button takes the command line to program. Program enters the commands to the line which is selected.

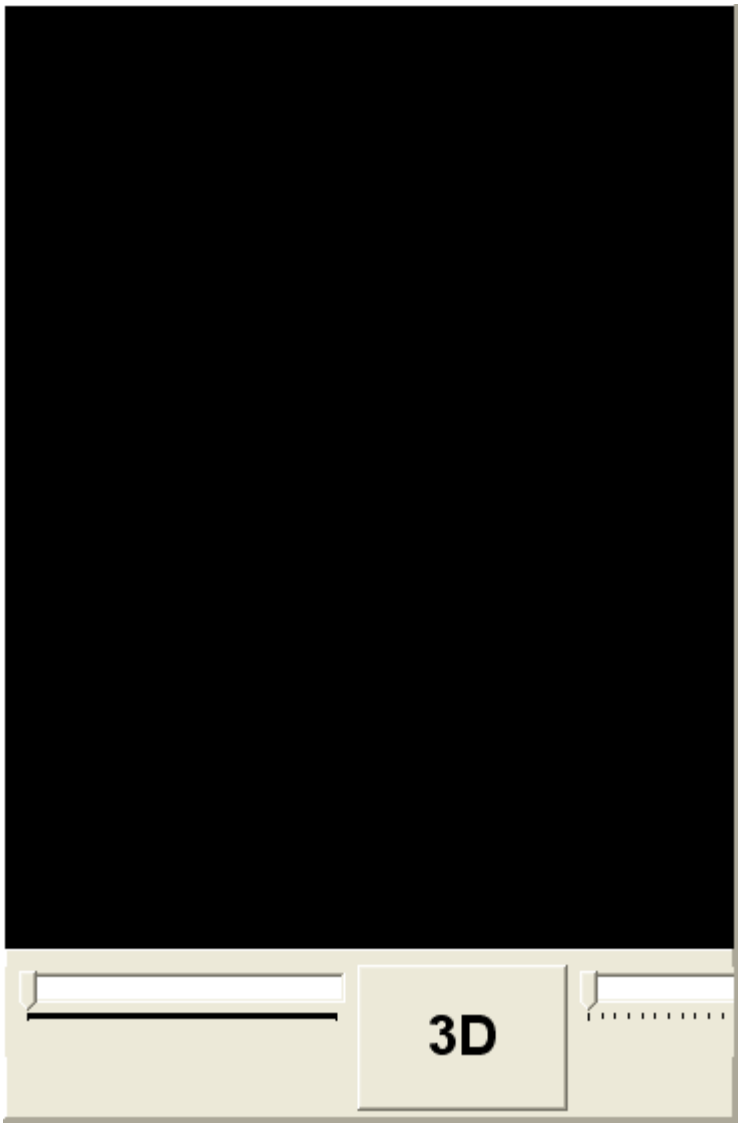
Delete Line: to delete the selected line.

ADD LINE: Adds new line(step) to the end.

INSERT LINE: Adds line(step) between two lines(steps).

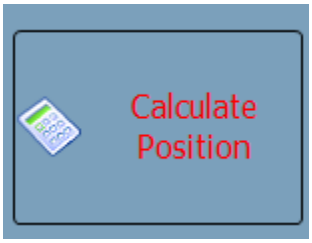


That screen shows the shape according to the command lines that entered. That screen shows us the mistake immediately, if there is an error on the command lines. When you click on the 3D button and if there is no error, this screen is used to show the shape.


3D

Finished Material Length Button: After finishing entering the command lines the length of the bent material has to be calculated. In the same time this button checks all the steps

of the program. If there is an error the program alerts the user. AK400 will not calculate the positions of the axes before the calculation of the material length.



Calculate Position: This function is active just after the clicking on the Finished Material Length Button. Even if you click on the Calculate button there will be no calculation.
When you click on calculate button, which function calculates and saves the values of the materials radius and rotation values.

AK400 performs the bending procedure in two phases. These are pre-bending and bending. Bending formation is given below. A radius bending process starts with defining of materials' radius to be bent.

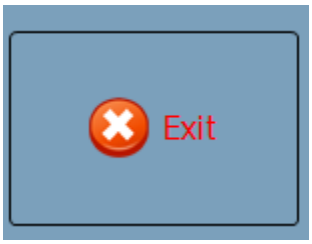
(Radius R:###.# A:###.# L:####)
<Radius Pre-Bending>(R:###.# A:###.# L:###)
.
. axes commands
.
<Radius Bending>(R:###.# A:###.# L:###)
.
. axes commands
.

(Radius R:###.# A:###.# L:####) : *It defines the radius of the material to be bent and and considered in two phases which are pre-bending and bending.*

<Radius Pre-Bending>(R:###.# A:###.# L:###): *It diefins pre-bending values for the radius to be bent. Commands below* ***<Radius Pre-Bending>*** *give the values of positions of pre-bending.*

<Radius Bending>(R:###.# A:###.# L**:###): It defines necessary positions of the axes just after the pre-bending.* ***<Radius Bending> *sometimes do not show up because the value of the pre-bending curving length is smaller than the pre-bending curving value.*

1.



Exit: To exit from the AK400 program. When you touch this button the program returns to main screen.

For Example:
Radius value of 500mm circle is desired to be bent. Programming of this circle should be like this; (material thickness is 6mm)

- Enter the name of the program
- Enter the thickness of the material
- Enter the program
- Calculate the material length
- Calculate the necessary positions for bending by touching calculate button.
- Return to main window by touching exit button.
- Open the program that we entered main screen.

1-) (Radius R:500.0 A:360.0 L:3142)
2-) <Radius Pre-Bending>(R:500.0 A:17.2 L:150)
3-) A:52.1
4-) B:25.0
5-) C:150
6-) (Bending)
7-) <Radius Bending>(R:500.0 A:342.8 L:2992)
8-) A:25.0
9-) B:80.4
10-)C:2992

When we open the program that we made there will a code screen will appear like above.
In first line it shows us the value of the radius. R500 means there will be a bending for 500mm. A360 means there will be a bending for 360 degrees. L3142 means there will be a bending for how long the machine will rotate.

In second line bending value definitions are given here. These values are necessary radius for pre-bending, radius angle and rotation. The rotation of the pre-bending value comes from the parameters of ARC.

In the lines 3.4.5. you can see the positions of the axes for pre-bending.

In seventh line bending is defined.

8.9.10. lines . you can see the positions of the axes for bending.

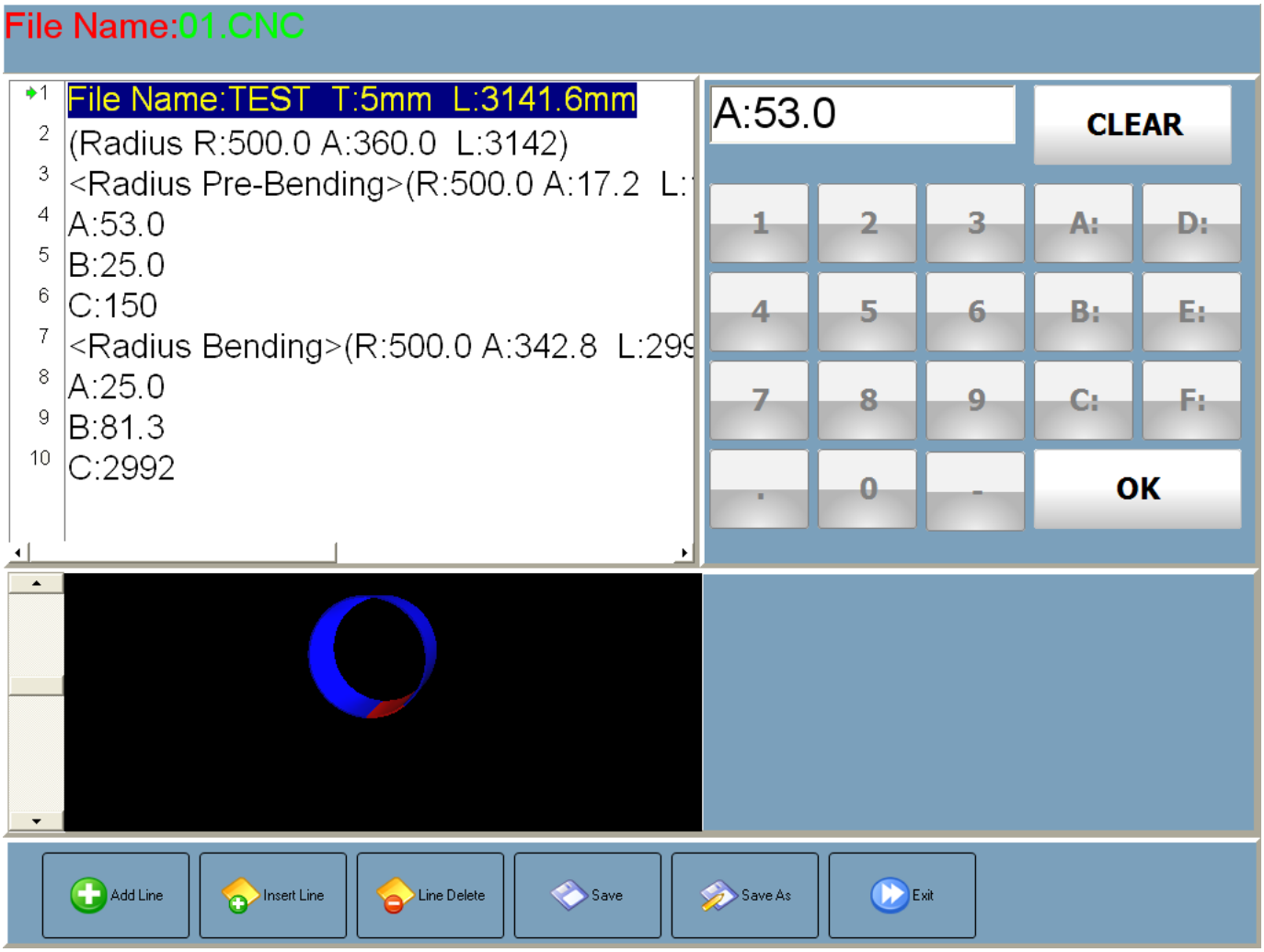
The definitions in (.....) and <.....> are just for information.

Programming a new Playback

In order to programm a new playback, touch the AUTO-button and be ensured that the AUTO-button is activated. After the activation of the “NEW PLAYBACK”-button, pres on this to open the virtual keyboard. Name the new bending process and confirm it with OK-button. The machine will position itself to the material feeding operation. Just after that the buzzer starts to beep. This is the signal for starting to feed the material and pinching the lower roll. Afterwards touch the “CONTINUE”-button. Just after the buzzer stops beeping, the material will be brought to the reference point. From this point on, every step will be recorded and saved by the NC-Programm. So it goes: Just after the Rolling to the left or right is completed, the relaving values of the left and right roll and the movement will be entered into the proceeding cell. Pres then on “RECORD END”-button in order to save the process automatically.

Editing Saved NC-Files :

Press the “Open NC-File”-button on the control screen. Select the bending process, you would like bend automatically and touch the “LOAD” button. Ensure that the “AUTO”-button is activated. If not, please activate this button and pres then the “START” button. The left and the right roll will locate themselves into the material feeding position. You will hear the beep signal now. This means you prompt have to feed the material and pinch the lower roll. Touch finally the CONTINUE-button.


File Name:01.CNC
1 File Name:TEST T:5mm L:3141.6mm
2 (Radius R:500.0 A:360.0 L:3142)
3 <Radius Pre-Bending>(R:500.0 A:17.2 L:
4 A:53.0
5 B:25.0
6 C:150
7 <Radius Bending>(R:500.0 A:342.8 L:299
8 A:25.0
9 B:81.3
10 C:2992
A:53.0
CLEAR
1
2
3
A:
D:
4
5
6
B:
E:
7
8
9
C:
F:
.
0
-
OK
Add Line
Insert Line
Line Delete
Save
Save As
Exit