Numeric Control for Rolls Plate Bending Machine

Brief Guide (GB)
User Documentation

Valid for:

Product: S550 SW 192
from version 7.6

Edition: Marzo 2011
Code: 91801.GB.4.GB

Esa/Gv s.r.l.
15 via Zamboni, CP 43
41011 Campogalliano Modena Italy
tel. +39 059 851414 - fax +39 059 851313
http://www.esagv.it - E-mail: info@esagv.it

Restrictions

Duplication, transmission and use of this document or its contents shall be considered prohitibed unless prior authorization has been received from Esa/Gv. All rights are reserved.
Even when authorized, modification of this document (either by computer or on paper) voids the guarantees specified below.

Guarantees

The product may offer performances that are not described in these manuals. Esa/Gv shall neither be obliged to maintain these functions in new versions of the product nor to guarantee the relative assistance.

Checks have been carried out in order to ensure that the contents of these manuals correspond to the documented product. Despite this fact, there may be discrepancies. Esa/Gv therefore offers no guarantees as to the full compliance and completeness of the texts.
The information in this document is periodically revised and new editions are issued when necessary.

This manual has been compiled in partial compliance with ANSI/IEEE std 1063-1987 "IEEE Standard for software User Documentation".

Editions

This document is liable to be modified without prior notice. These modifications may involve further editions or revisions of the document.
Further editions imply complete substitution of the document.
Revision involves replacement/addition/elimination of pages of the document.
Each page is identified by the code of the document at the bottom.

Notes

MS-DOS® Trademark registered by Microsoft Corporation.

The chronological list of editions of this document is given in the following table:

Evolution of the document

Edition	Document Code	Release	Type of edition
13/09/2006	91801.GB.2.GB	2	Revision
16/04/2007	91801.GB.3.GB	3	Revision
15/03/2011	91801.GB.4.GB	4	Revision

Modifications

Release	Chapters - Pages	Description

Brief Guide

END OF SUMMARY

Notes for the reader

General information

The information in this manual only applies to the software versions indicated on the frontispiece.

Not all the available functions may be described in this manual. In these cases, Esa/Gv shall be obliged to neither guarantee these functions nor include them in future versions.

Purpose

The purpose of this manual is to help the operator during use of the product described in the frontispiece and when installing / using the office software.

Users

This manual contains information for:

- machine operators with no basic knowledge of computer work;
- operators/installer technicians familiar with the P.C. MS-DOS ® environment.

Use of the manual

The manual is divided into chapters describing the more common functions of the numeric control and the Office Software installation procedure.

Notification of difficulties

Please contact Esa/Gv if any difficulties should arise when this manual is used.

Explanation of the symbols

Graphic symbols may appear beside the text. These are used to emphasize information of particular importance.

Attention
This symbol is used when failure to take the appropriate precautions **could cause slight damage to persons and property**.

Danger
This symbol appears when failure to take the appropriate precautions or accomplishment of incorrect manoeuvres **could cause serious damage to persons and/or property**.

Important
This symbol appears in the manual to indicate information of particular importance. It is essential to read these sections in order to fully understand the manual.

Option
This symbol indicates sections of the manual that describe optional functions or parts. Use of optional performances must be established with the machine manufacturer.

Manufacturer
This symbol indicates those sections of the manual reserved to the machine manufacturer.

Password
This symbol indicates sections of the manual that describe functions access to which is safeguarded by software passwords.

CN
This symbol indicates sections of the manual that describe functions only available in CN and not in the PC.

PC
This symbol indicates sections of the manual that describe functions only available in the PC and not in CN.

Printer's conventions

Particular printer's conventions are used to make it easier to identify the information in this manual. These conventions are illustrated below.

Keyboard and video

The following conventions are used.

- The names of the screen-printed keys are indicated in **boldface** and are enclosed within square brackets. If the name of the key is preceded by "button", reference is being made to a key on the push button panel.
  - **[ENTER]**. Identifies the key that bears the word ENTER.
  - **[+]** indicates the + key of the keyboard, while button **[+]** indicates the + key of the push button panel.
- The names of the function keys are indicated in ***boldface italics*** and are enclosed within square brackets.
  - **[*Plc Menu*]**. Identifies the function key that bears the words Plc Menu.
- References to fields and/or messages on the video are written in ***boldface italics***.
- The specific text to be digitized by the user is underlined.
  - If the manual indicates "digitize ok, the user must digitize exactly "ok".
- DIRECTION or DIRECTIONAL keys is the collective name used to indicate the UP, DOWN, LEFT and RIGHT keys.
- Pressure, in sequence, on a series of keys is written by separating the identifiers of the required keys with the ">" character.
  - **[*Manual*]** > **[START]**. Describes pressure, in sequence, on the **[*Manual*]** and **[START]** keys.
- Pressure on several keys at the same time is indicated by separating the identifiers of the keys themselves with the "+" character.
  - **[SHIFT]** + **[→]** Describes contemporaneous pressure on the **[SHIFT]** and **[→]** keys.

Text

The following conventions are used.

- *Italics* are used to identify specialistic terms.
- **Boldface** is used to emphasize words of particular importance.

Glossary

CNC This is an abbreviation of *Computerized Numerical Control* and indicates the instrument that governs the machine, i.e. the electronic device through which the machining cycles are programmed, the axes moved, etc..
It corresponds to one of the devices whose operation is described in this manual.

Backup CNC data saving operation. The data are copied from CNC to Floppy disk.

Restore CNC data resetting operation. The data are copied from Floppy disk to CNC.

Range Values interval included in a list.

BCR This is the abbreviation of *BarCode Reader* and indicates the device that reads a label printed by barcode .

NC Represents the normally closed status of an input or an output.

NA Represents the normally open status of an input or an output.

END OF PREFACE

1 Brief Guide section A

1.1 Operations required on powering

To access the automatic phase and execute a work program, it is **obligatory** to size the axes at least the first time the numeric control is powered.

It is also advisable to size the axes after this if there are doubts as to whether the current axes targets are correct. The current targets may not be correct if an axis was moved in the manual mode when the numeric control was off

1.2 Direct sizing of the axes

Comply with the following procedure to size the axes:

1) Press  .
2) Move the cursor to the required axis.
3) Bring the axis to the required target (tangent to the upper roller to size on the 0 mark).
4) Press **[*Direct Sizing*]**.
5) Enter the target to which the axis has positioned in the relative window and press **[*Confirm*]**.

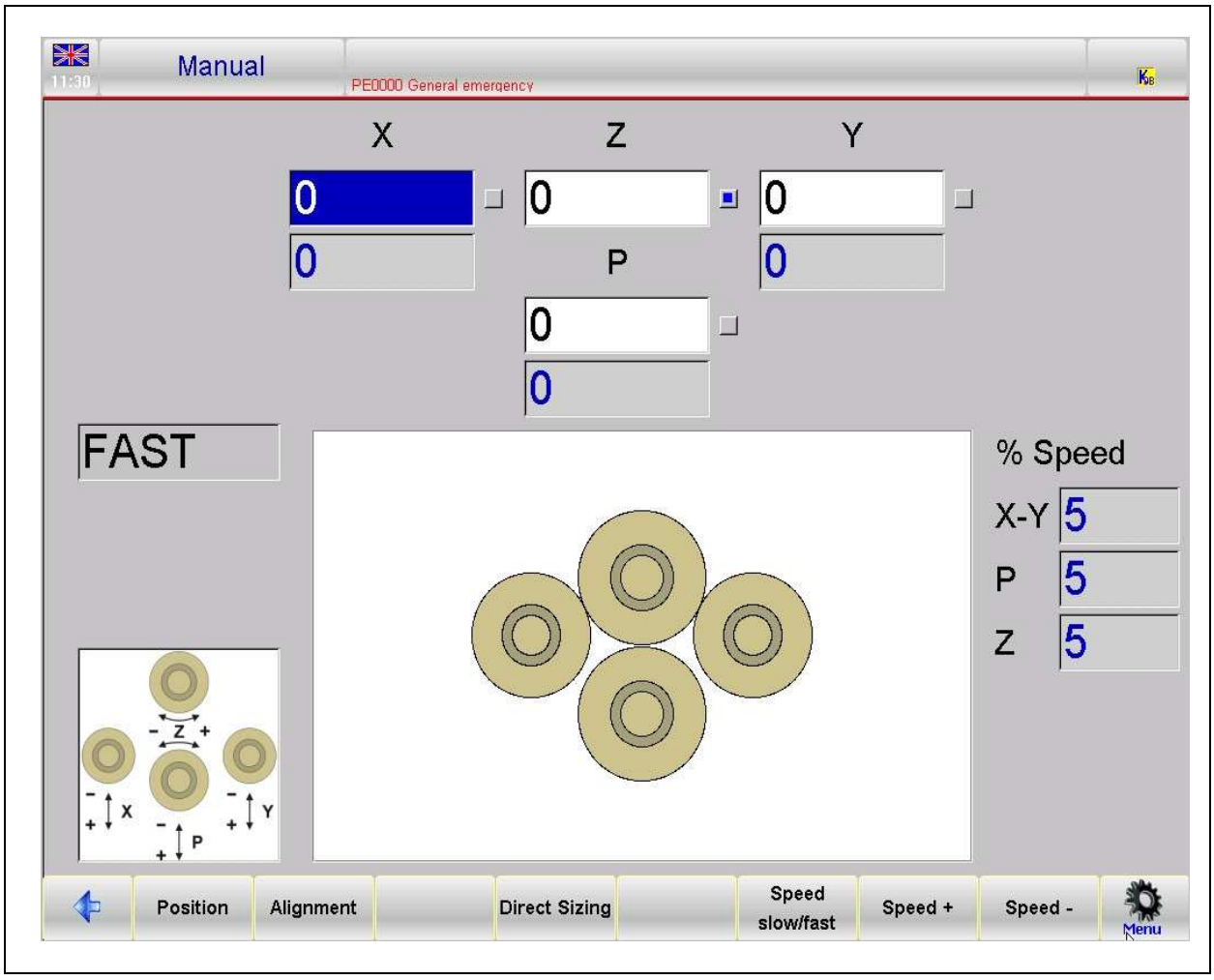


Figure 1.1 – MANUAL mask

To move the axes in the manual mode, turn the plate selector to “MANUAL” and then move the axis with the plate levers or buttons.

Sizing will only occur if there are no alarms in progress.

If each of the side rollers and the crimping roller are controlled by two axes in order to form tapered shapes, the target of both axes can be displayed in the manual mask as shown in the figure.
These targets will be visible if 1 is entered for generic parameter ***Display axes targets for tapers***, otherwise they will disappear if 0 is entered. This parameter is available in the **Generic Parameters** page.

1.2.1 Manual mask with supports and turret

The following manual mask will appear if the machine has the side supports and turret:

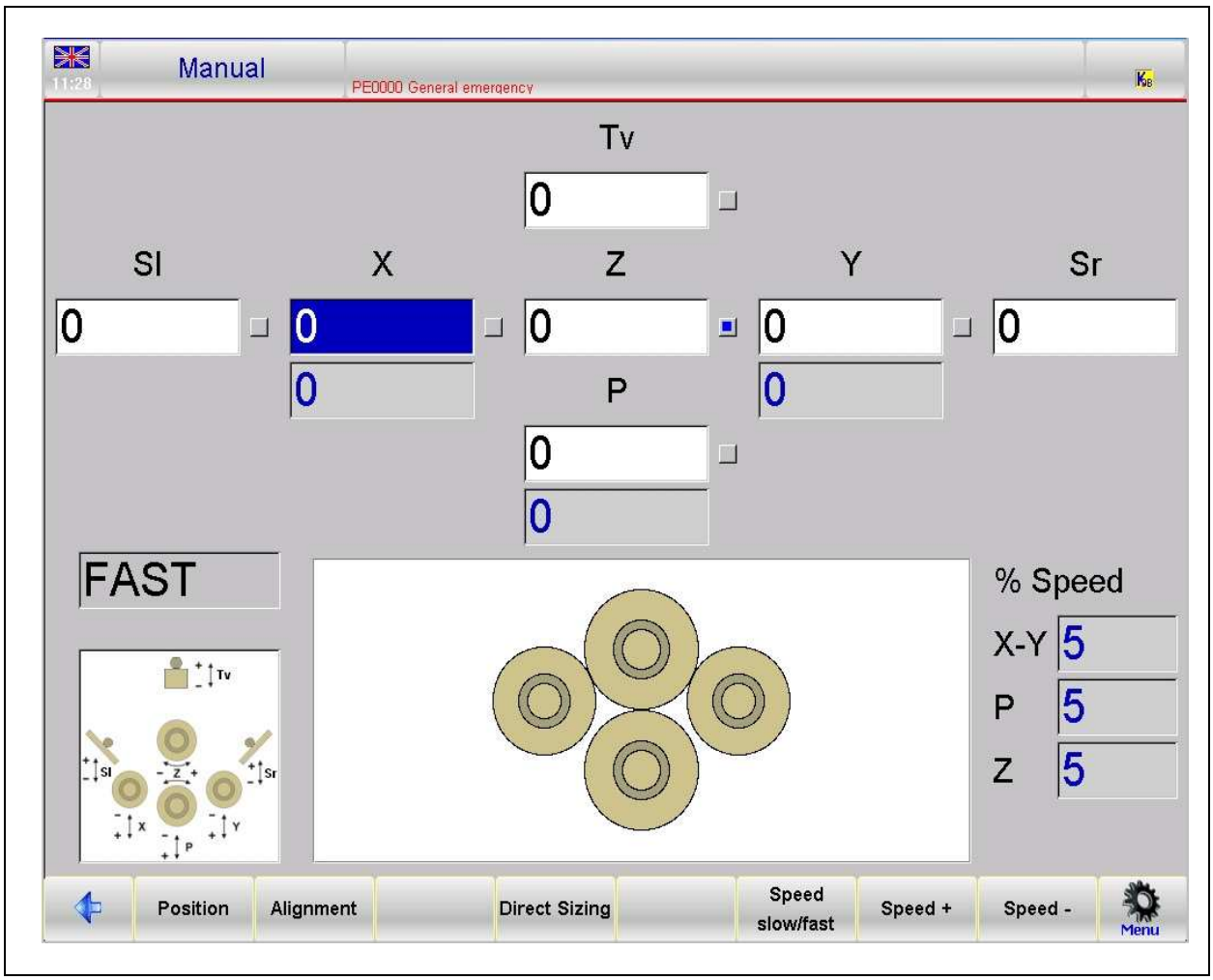


Figure 1.2 - MANUAL mask with supports and turret

where:
Sl = left-hand side support
Sr = right-hand side support
Tv = vertical turret

1.3 General sizing of the axes

Comply with the following procedure to size all the axes together:

1) Press  .
2) Press **[*General Sizing*]**.
3) Press START.

This function is only available if the NC is able to deal with it and can be enabled by means of generic parameter ***Enab.automatic sizing*** in the **Generic Parameters** page.

1.4 Single axis sizing

Comply with the following procedure to size each axis individually:

1) Press  .
2) Press **[*General Sizing*]**.
3) Press **[*Single Sizing*]**.
4) Move the cursor to the required axis.
5) Press START

This function is only available if the NC is able to deal with it and can be enabled by means of generic parameter ***Enab.automatic sizing*** in the **Generic Parameters** page.

1.5 X and Y axes in the fast or slow modes

X and Y axes can be moved in the fast or slow modes in the manual mask, if the NC is able to handle the function. Proceed as described below:

1) Press 

2) Press **[*Slow/Fast speed*]** to enable the axes to move in the fast mode.

3) Press **[*Slow/Fast speed*]** to enable the axes to move in the slow mode.

A message in the page indicates whether the slow or fast speed has been selected.

1.6 Speed override setting

The speed overrides of axes X-Y, P and Z are displayed in the manual page. The override of the axis currently selected in the page can be changed with the **[*Vel* +]** and **[*Vel* -]** keys.

1.7 Alignment

The **[*Alignment*]** key allows rollers X,X1 or Y,Y1 or P,P1 to be aligned upon the next manual command, depending on the axis selected.

1.8 List of programs

Comply with the following procedure to access the programs list:

- press 

;
- the following window will appear:

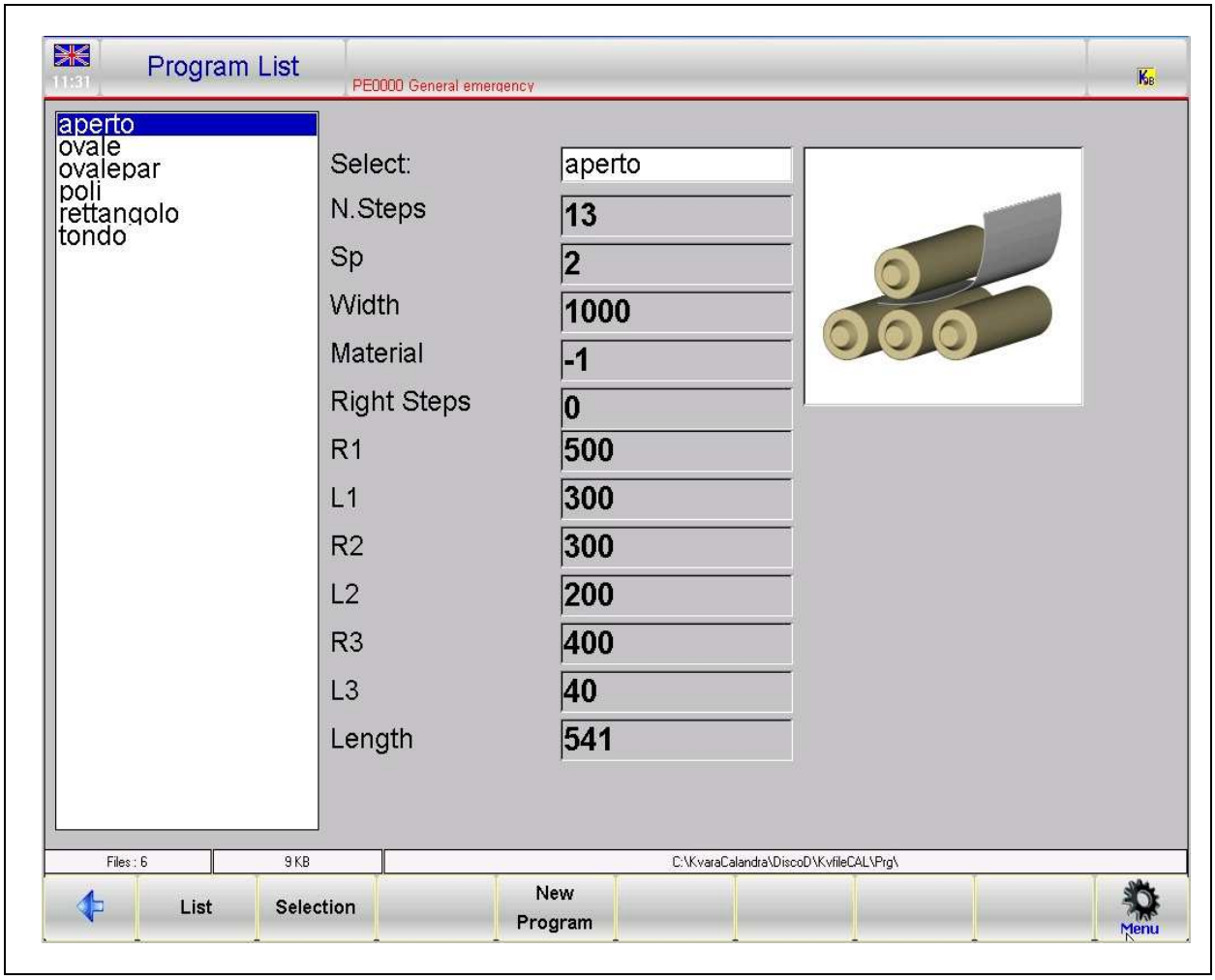


Figure 1.3 – Program list

The window on the left is the list window (list).
The central boxes give the data of the program to which the cursor has set (in the list).
The figure on the right displays the type of shape produced by the program.

Just use keys ▼ and ▲ to scroll through the programs available in the list.

The function keys take on the following meaning:

- **[*List*]** to move the cursor to the list window;
- **[*Selection*]** to move the cursor to the Select window and enter the program name in the manual mode;
- **[*New Program*]** to enter a new numeric program;

How to copy a program

Used to create a copy of the program with another name in order to modify it. Go to the program you want to copy and comply with the following procedure:

- press the 

key to access the menu;
- select the ***Copy*** item.
- enter the program name in the window that appears.
- After having entered the name, go to the **[Confirm]** button and press **[ENTER]**.

How to rename a program

Changes the name of a program. Go to the program you wish to rename and comply with the following procedure:

- press the 

key to access the menu;
- select the ***Rename*** item.
- enter the new program name in the window that appears.
- After having entered the name, go to the **[Confirm]** button and press **[ENTER]**.

Show/hide data

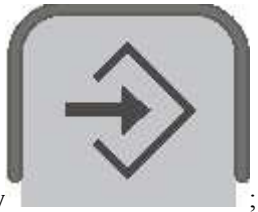
Used to either show or hide the data in the selected program:

- press the 

key to access the menu;
- select the ***Show Data*** item;

How to save a program

Saves a program on backup unit so that it can be transferred to another numeric control (also useful for creating backup copies). Go to the program you want to save and comply with the following procedure:

- press the key  ;

- the selected program will be copied on floppy disk.

How to delete a program

Used to eliminate a program. Go to the program you wish to eliminate and comply with the following procedure:

- press the  key;
- press **[ENTER];**
- the selected program will be deleted.

How to save all the programs on backup unit

Saves all the programs on backup unit so that they can be transferred to another numeric control (also useful for creating backup copies). Comply with the following procedure:

- insert a backup support with enough space to contain the programs;
- press the 

key to access the menu;
- select the ***Save Programs*** item;
- All the programs will be saved on the backup unit.

How to delete all the programs

Cancels all the programs. Comply with the following procedure:

- press the 

key to access the menu;
- select the ***Delete Programs*** item;
- All the programs will be deleted.

List of programs on backup support

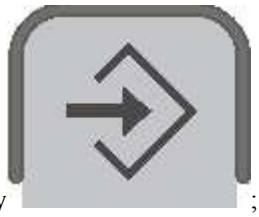
Used for displaying the list of programs on floppy disk. The operations available are the same as those for the program list, thus all the tools on the floppy disk can be copied, renamed and deleted. Select the program list and comply with the following procedure:

- enter a backup support containing the programs (created by kvara) ;

- press the key;
- the list of programs in the backup unit will be displayed;
- proceed with the required operation.

How to save a program from backup unit to NC

Used for saving a program in the NC from a floppy disk so as to load it from another numeric control. Go to the program you want to save and comply with the following procedure:



- press the key ; the selected program will be saved from the backup unit to the NC.

How to save all programs from backup unit to NC

Used for saving all the programs in the NC from abackup unit so as to load them from another numeric control. Comply with the following procedure:

- enter a backup support containing the programs (created by kvara) ;

- press the key ;
- the list of programs in the backup unit disk will be displayed;

- press the key to access the menu;
- select the ***Save Programs*** item;
- all the programs will be saved from the backup unit into the NC.

1.9 Calender geometry

The geometry of the calender must be described by means of the data entered in the Geometry mask before the calculation formulas for the roller targets can be considered valid.

Press the  key to access the following page:

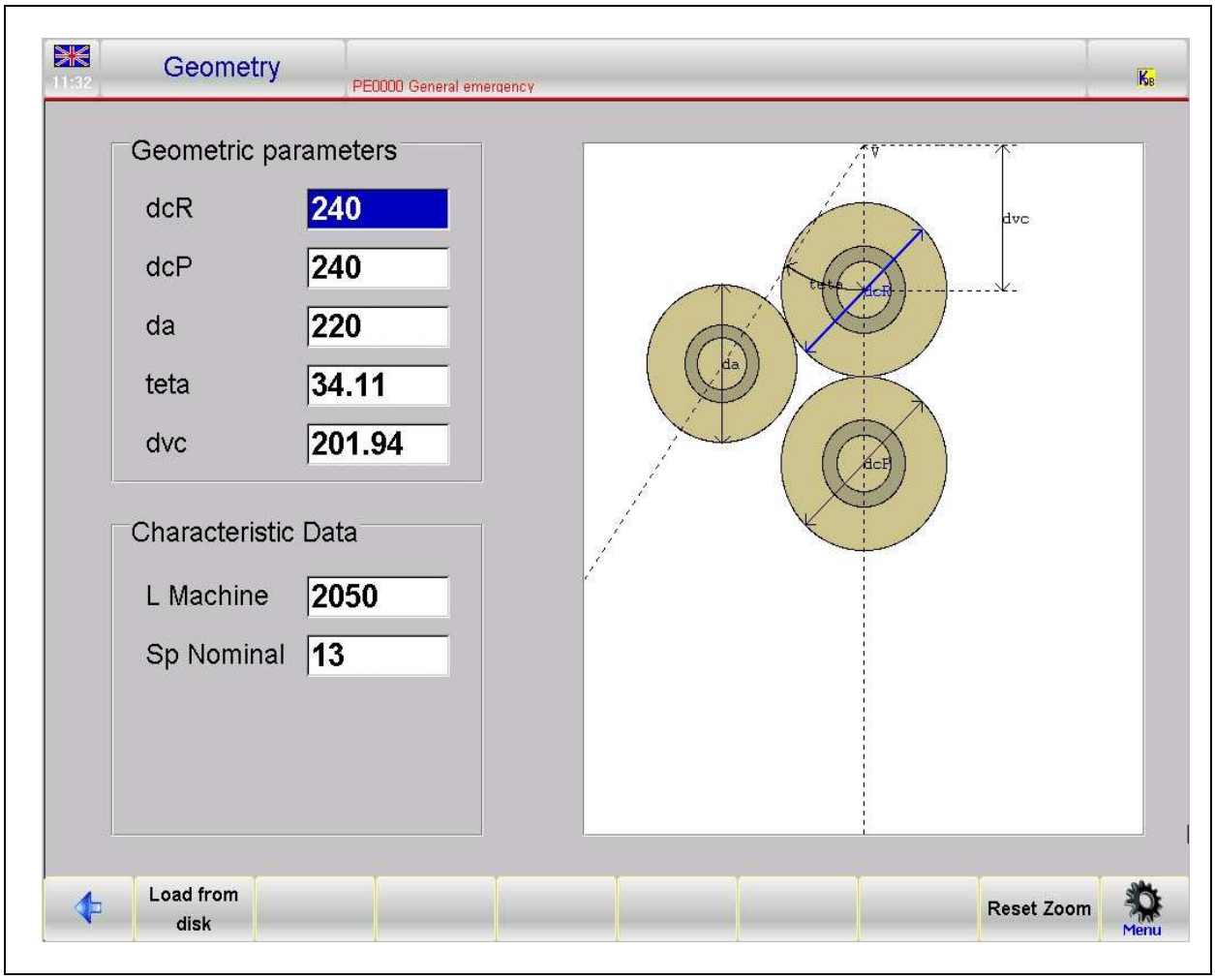


Figure 1.4 – Calender geometry mask

The geometry can be planetary or pyramidal.
The type of geometry is entered by means of generic parameter ***Pyramidal Calender*** in the **Generic Parameters** mask. Enter 1 for pyramidal geometry, otherwise the geometry will be planetary.

1.10 Creation of a work program

Proceed as described to enter a new numeric program:

press ;
press **[*New Program*]**.

Selection of the required shape

Select the type of shape required in the window that appears:

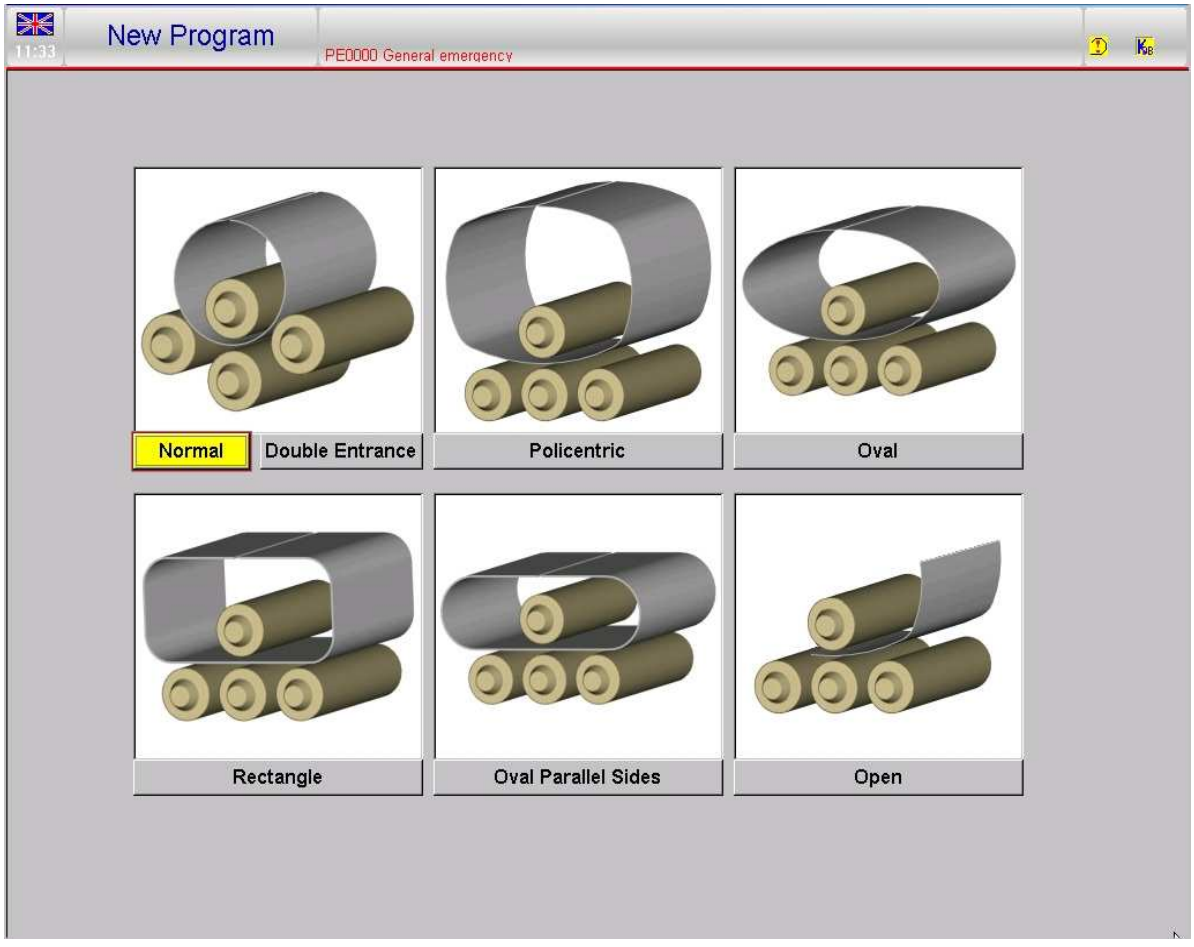


Figure 1.5 - Shape selection page 1

The following shapes can be selected:

- normal or double entrance round;
- polycentric;
- oval;
- rectangle;
- oval with parallel sides;
- open shape.

Press **[PgDn]** to display a second shape selection mask:

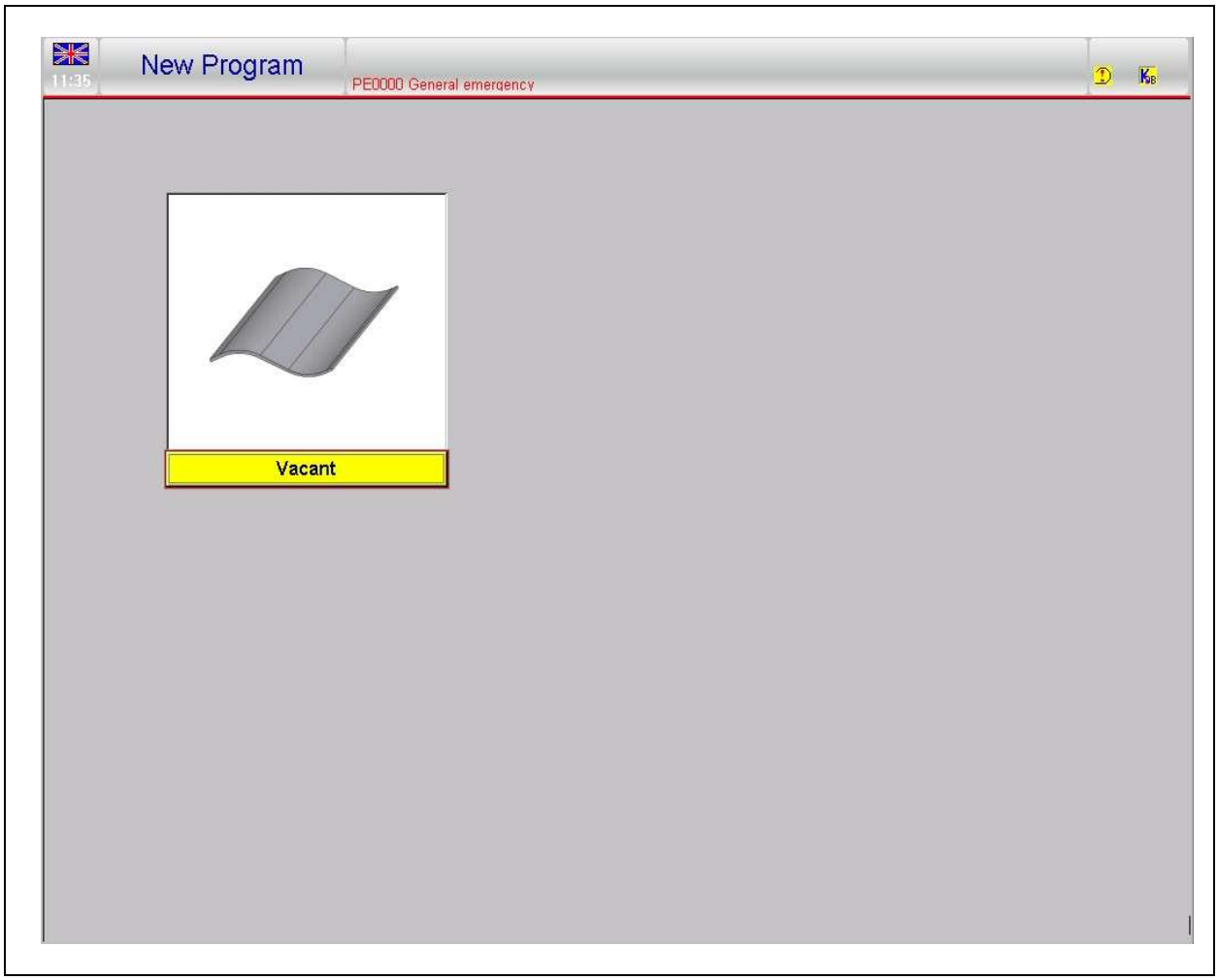


Figure 1.6 - Shape selection page 2

where the free shape can be selected.
If the turret is installed, the second form selection mask will be the one below:

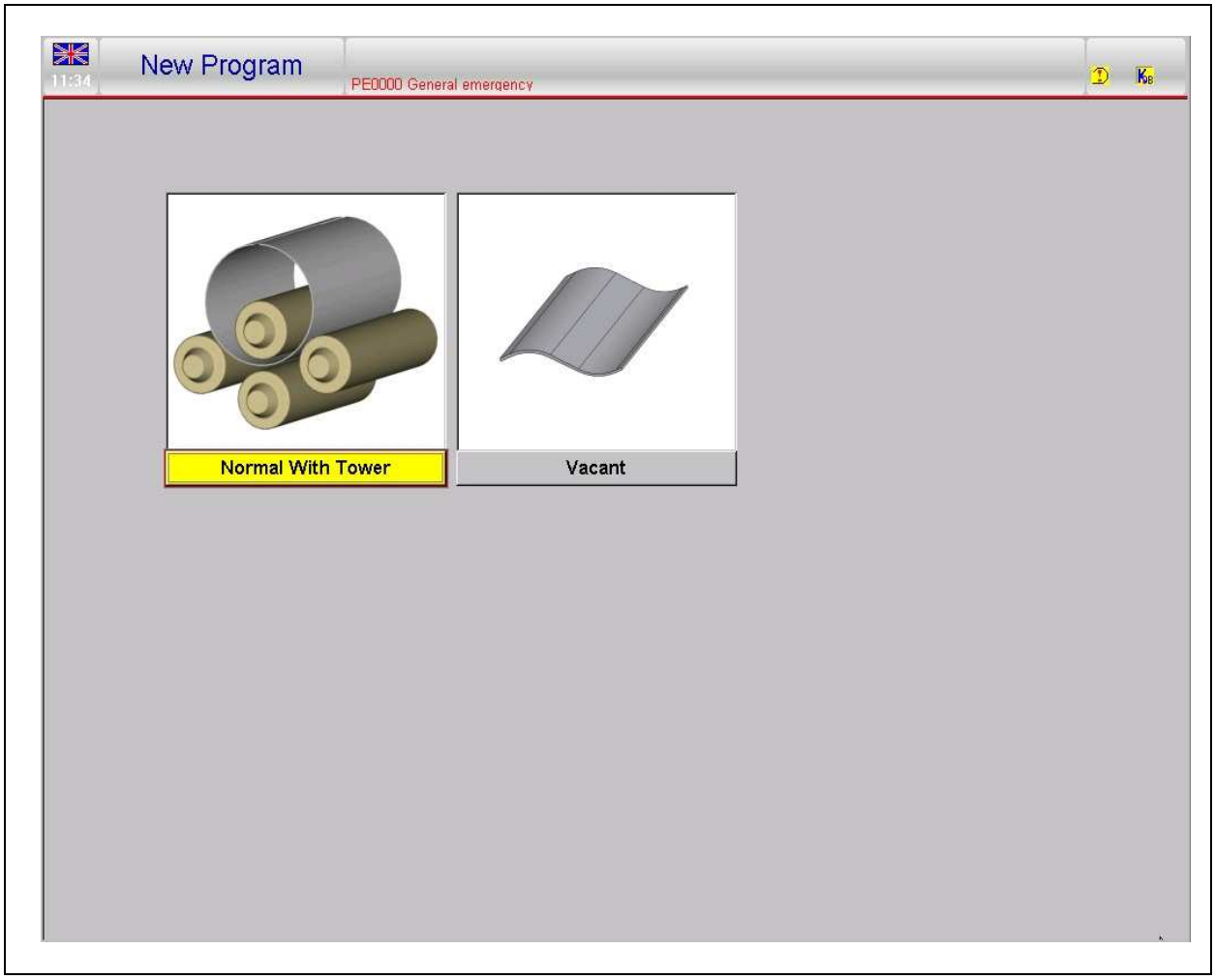


Figure 1.7 - Shape selection page 2 with turret

where the round shape with turret management can be selected.

Press **[PgUp]** to go back to the first shape selection mask.
Use the directional keys to select the button corresponding to the required shape and press **[ENTER]**.
This will access a window used for entering the general data of the program, data which do not depend on the type of shape selected.

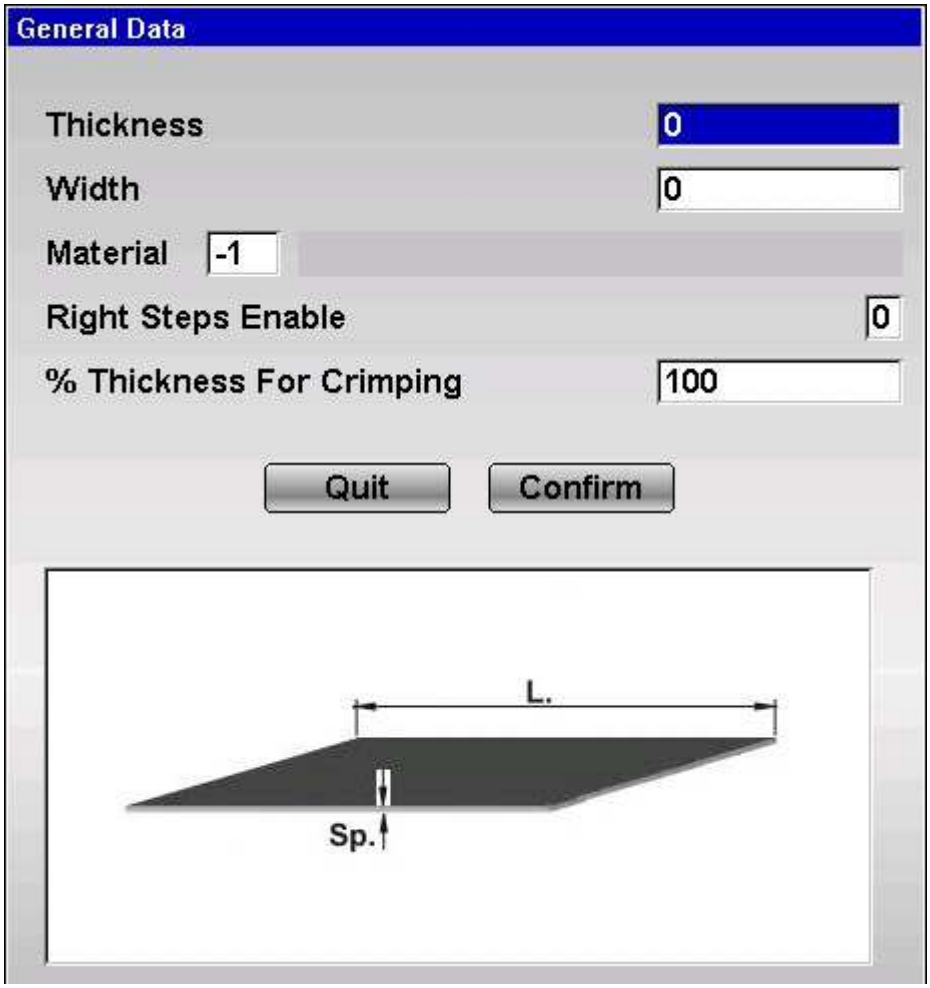


Figure 1.8 – General data mask

The following information must be entered in this dialog window:

- the thickness of the metal plate;
- The width of the plate.
- the code of the material;
- the direction in which the plate is inserted: enter 1 in the **Enable Right Steps** field if the plate is inserted from the right.
- the % of the thickness for crimping.

Press **[Confirm]** to access a window where the program data are entered. These data depend on the shape required.

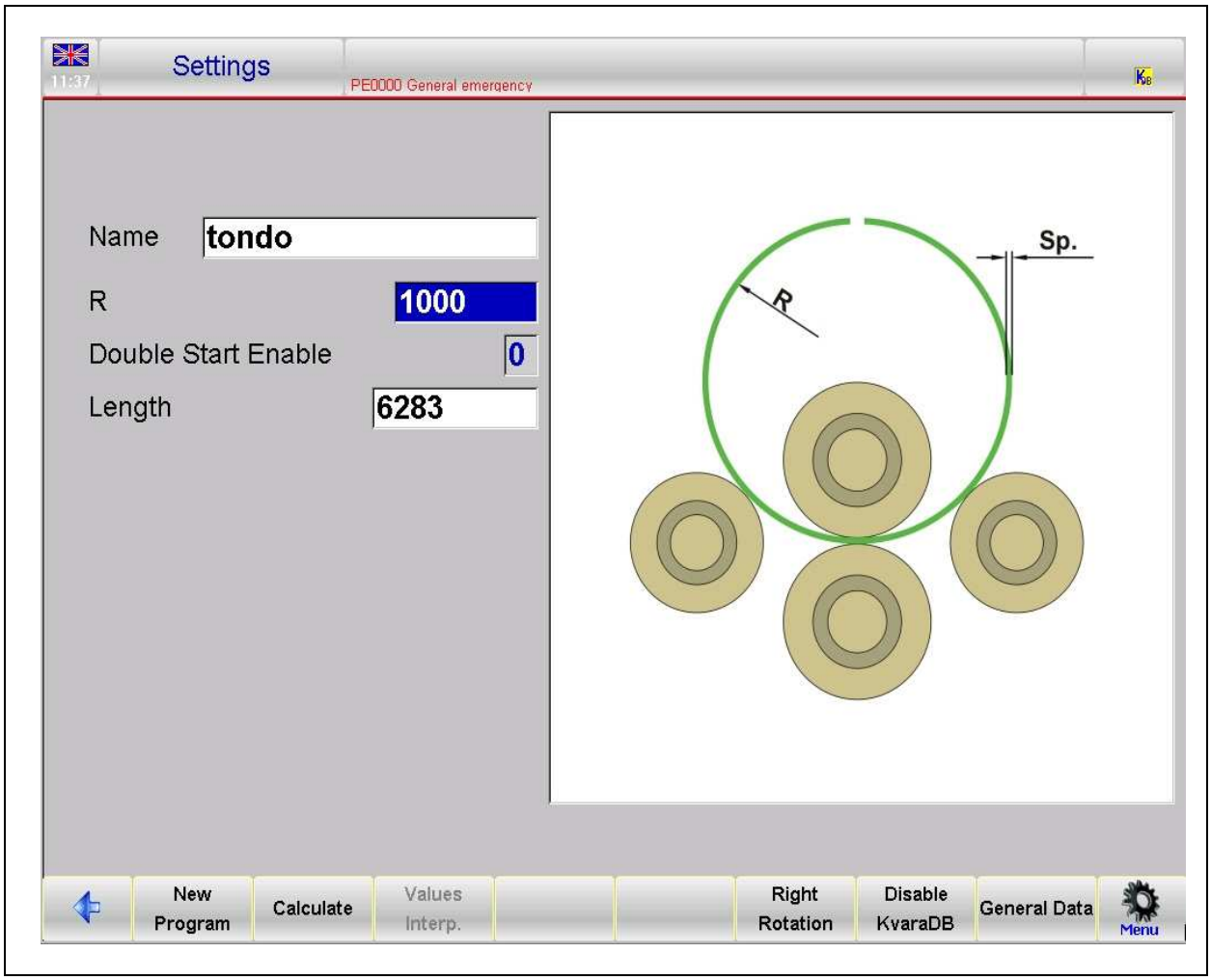


Figure 1.9 – Normal round entry mask

- enter the **radius** of the base in field **R**;

Automatic program calculation

All the steps are calculated along with the relative targets:

Press the **[*Calculate*]** function key. All the steps are calculated and the 3D Autolearning mask is accessed automatically.
If a material has been entered, the corrections of the Material Correction Table in % and the Correction Database are used during the step sequence creation phase: first enter the percentage correction for the geometric target is entered then add the correction taken from the database.

Full program rotation

This function turns all the program steps so that a workpiece that was formerly inserted from the left can now be inserted from the right, and vice versa.
Comply with the following procedure:

- Press the **[*Turn Rh*]** function key.

- press **Yes** in answer to the request to confirm the operation;
- the program will be turned to the right.

If the ***[Turn Lh]*** function key is now pressed, the program will go back to being turned to the left as it was previously.

Enable KvaraDB

Enables use of a correction database for the entrance and calendering targets:

- Press the **[*Enable KvaraDB*]** function key: the  icon will appear at the top right; press the **[*Disable KvaraDB*]** to disable use of the database.

General data dialog

Comply with the following procedure to display the dialog window of the general program data:

- Press the **[*General Data*]** function key.
- the general data of the program can now be edited.

The program data to enter change, depending on the shape required. Thus, the various data entry masks will be different.

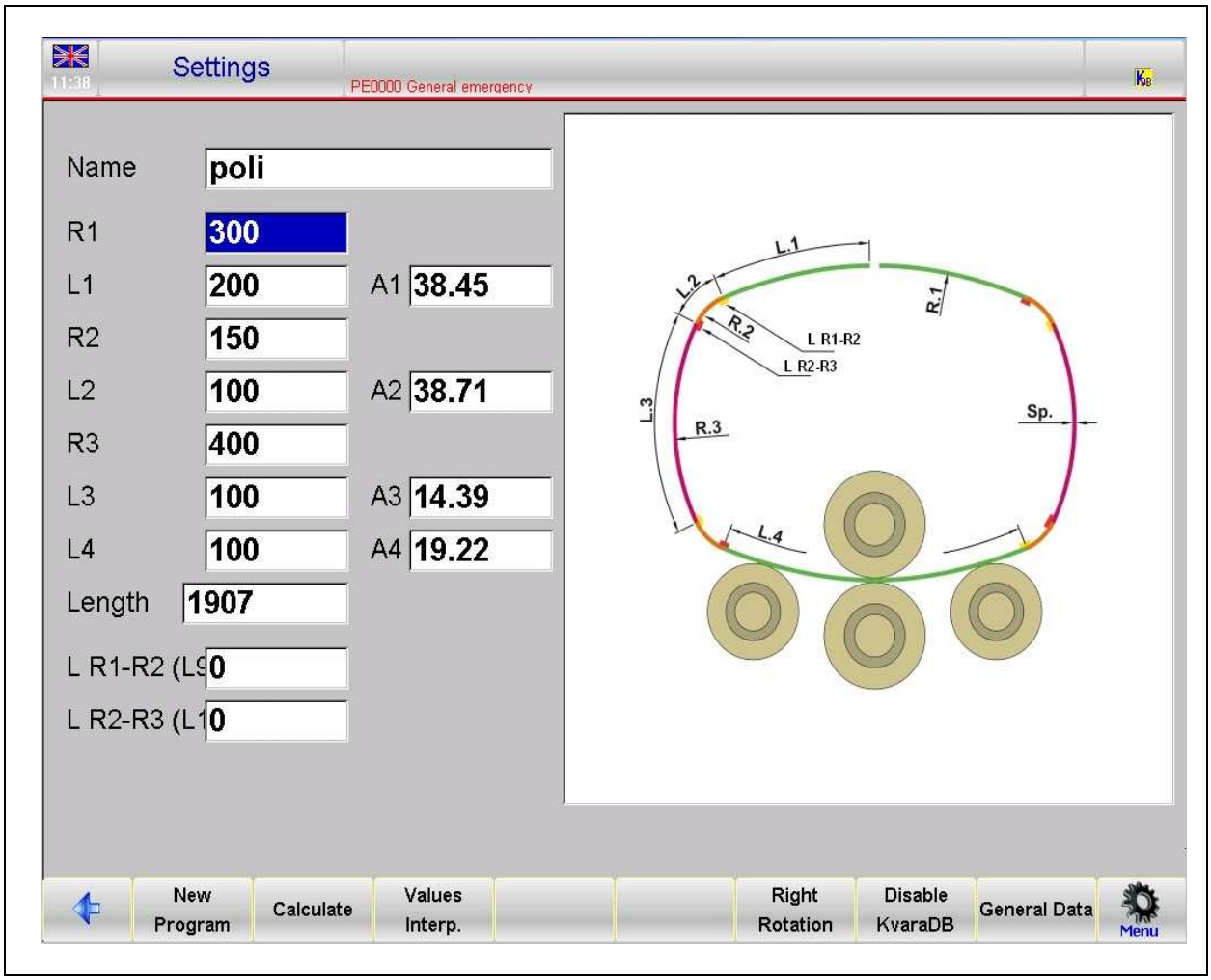


Figure 1.10 – Polycentric data entry mask

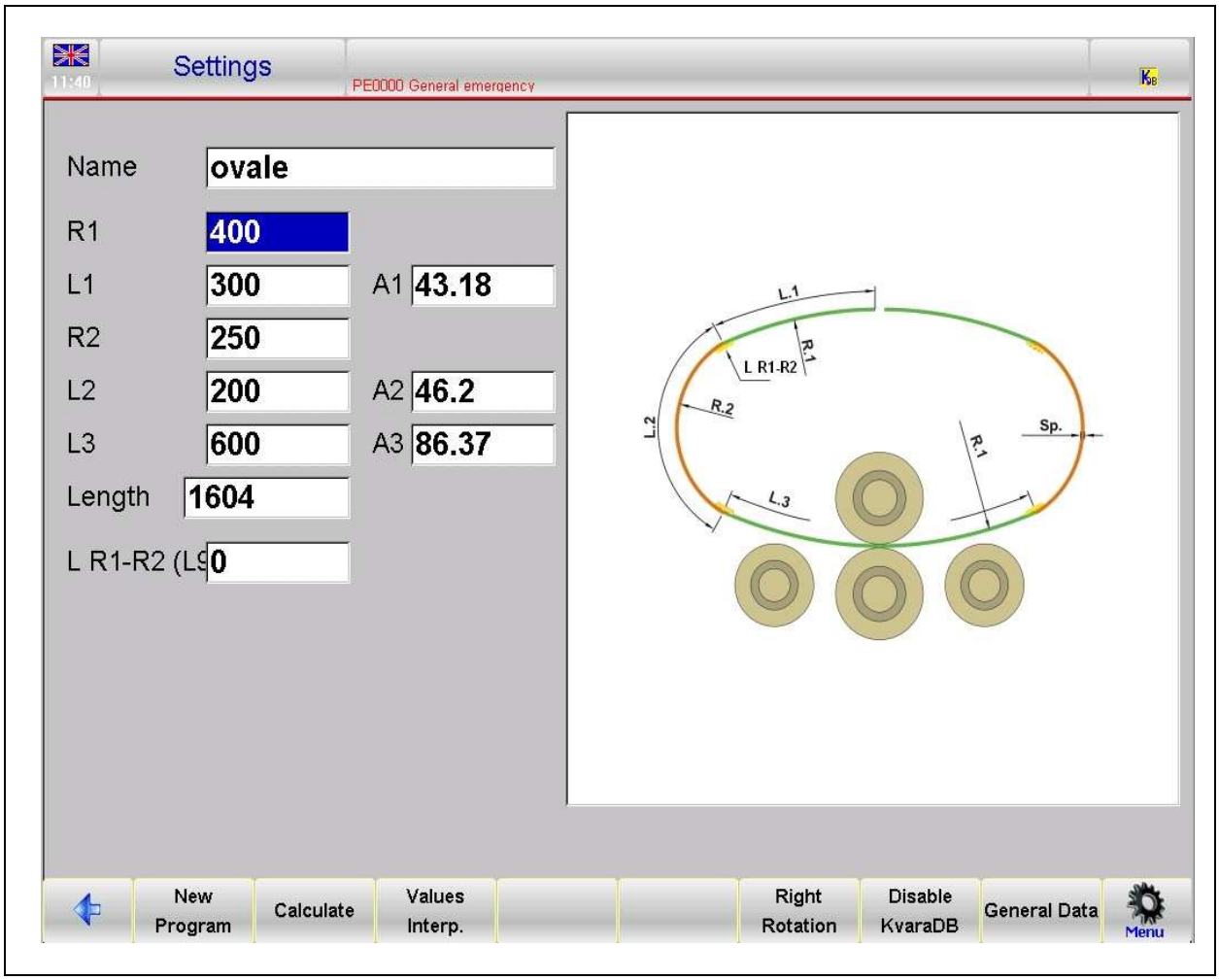


Figure 1.11 – Oval data entry mask

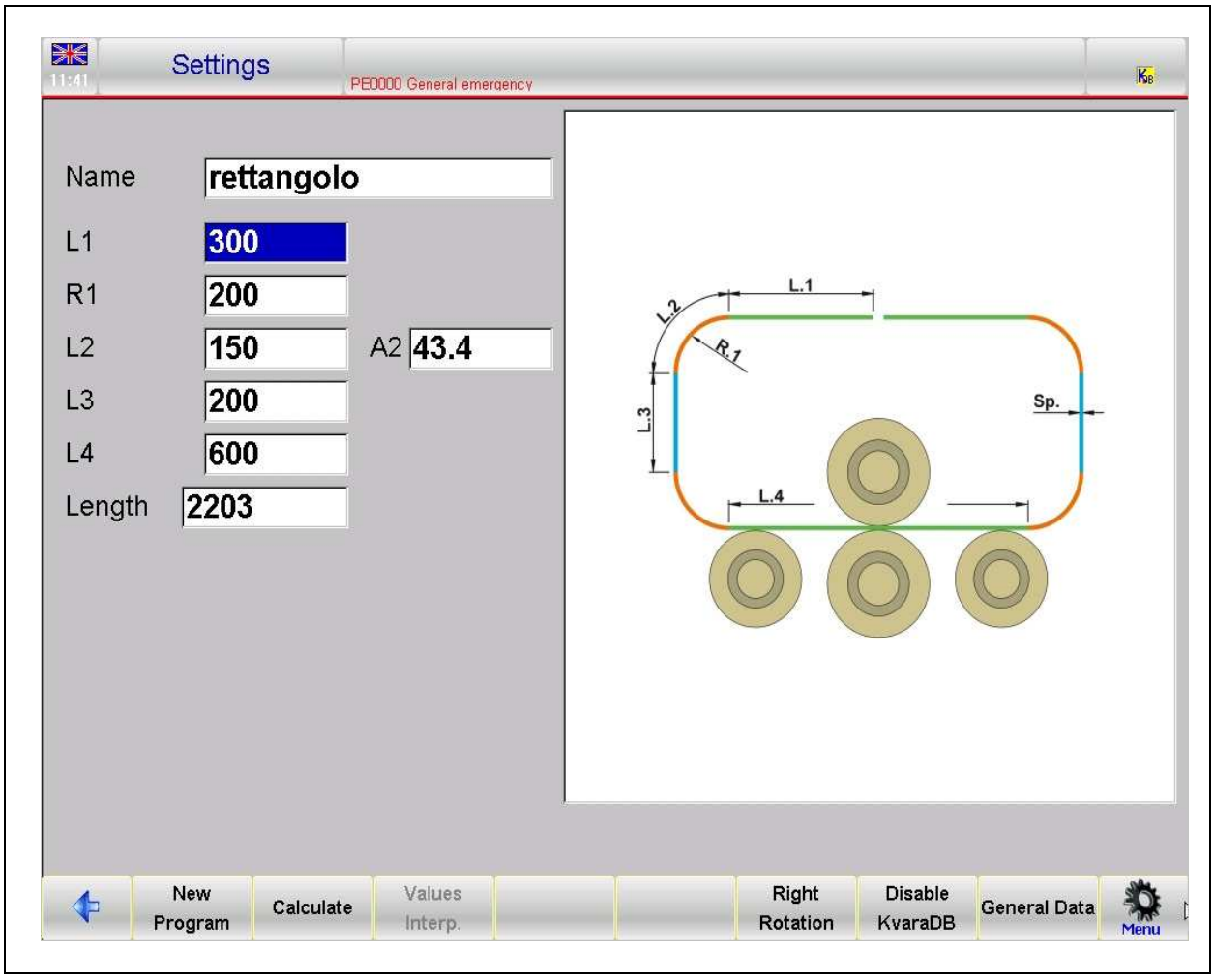


Figure 1.12 – Rectangle data entry mask

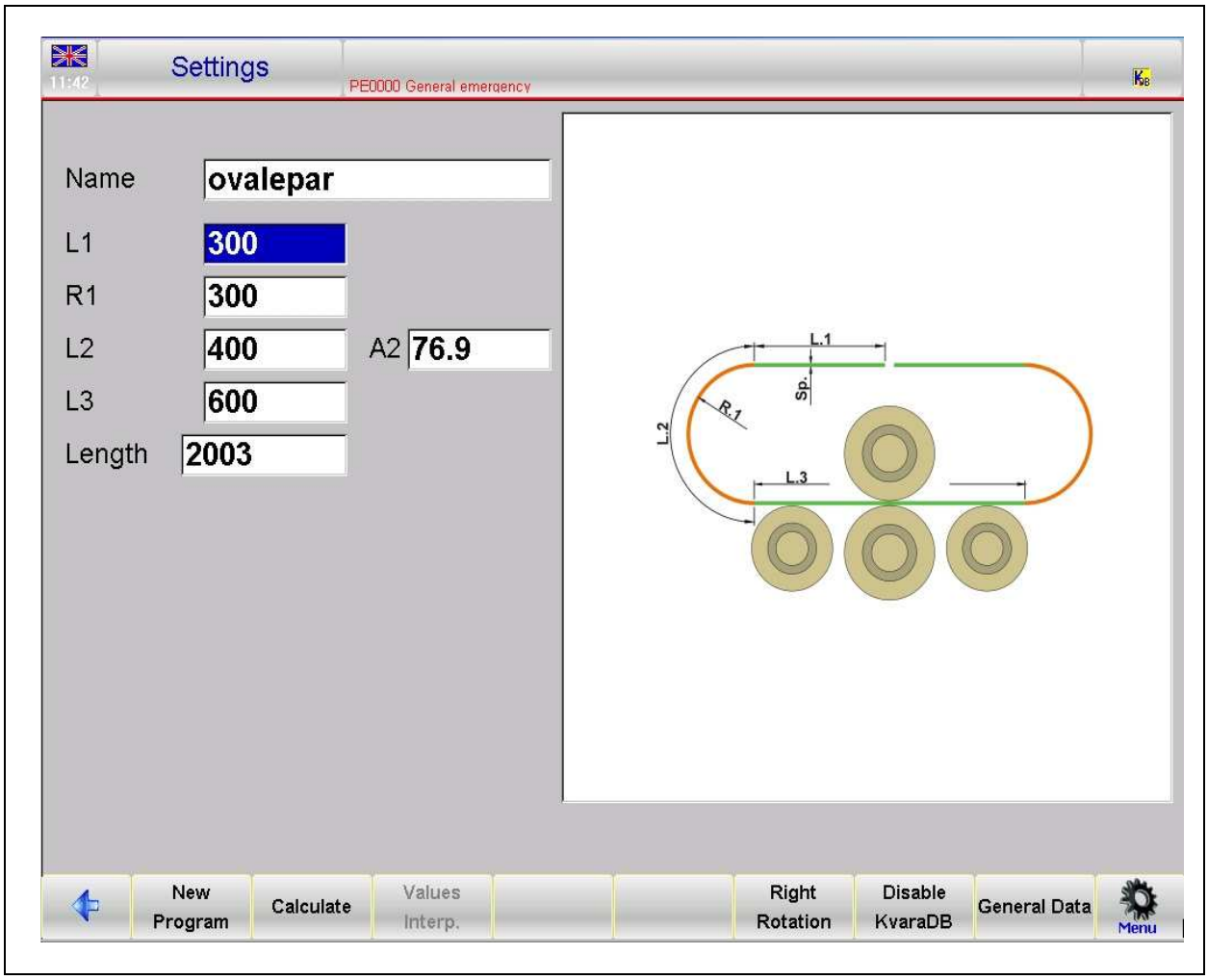


Figure 1.13 – Oval with parallel sides data entry mask

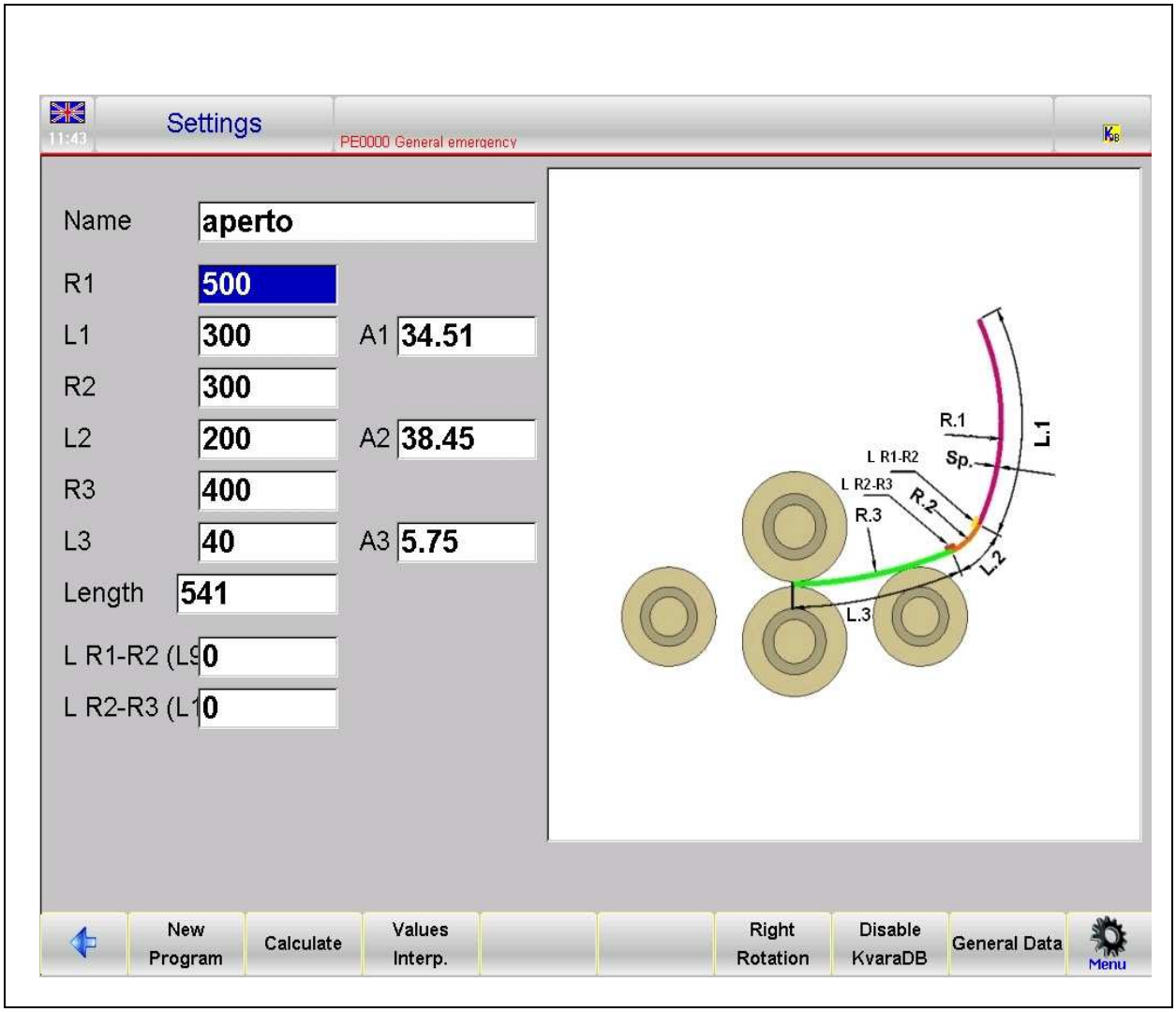


Figure 1.14 – Open figure data entry mask

The following data entry mask will appear if the free shape option is selected:

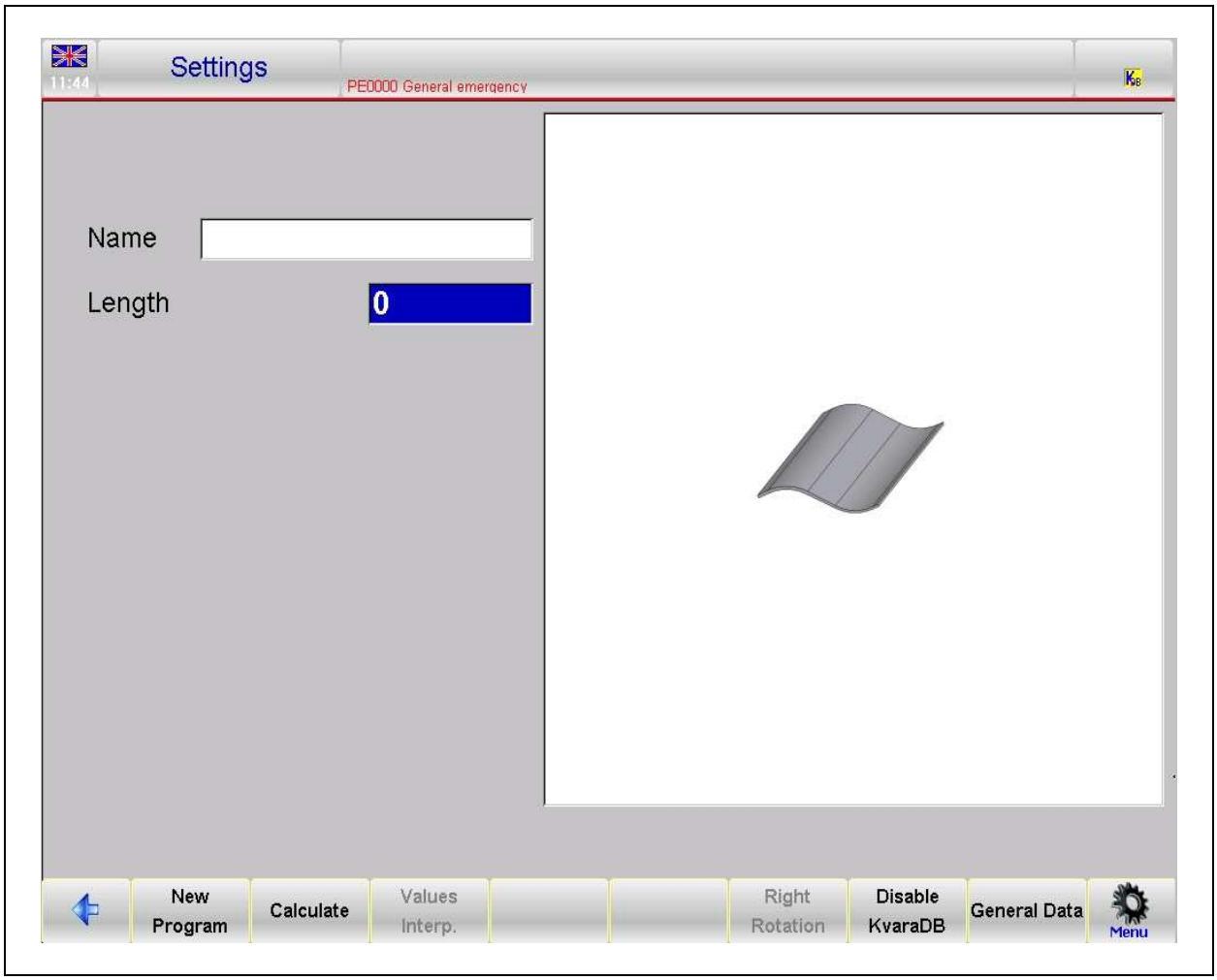
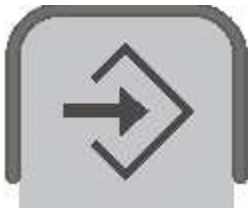


Figure 1.15 – Free data entry mask

The **[*Calculate*]** key will not generate any steps in this mask. The step sequence must be created by the operator in the manual mode from the 3DAutolearning mask.
In figures differing from the round one, the radii and the lengths of the sections must be entered into the settings mask so as to describe the figure required. The angle that describes the section in question can be entered as an alternative to the length.
Once the radius has been entered, modify the length by changing the angle, and vice versa. If the radius is modified, the length value must remain unchanged, thus the value of the angle will change as a consequence.

How to save the program



Press once the entries have been made. Enter the name of the program in the window that appears
After having entered the name, go to the **[Confirm]** button and press **[ENTER]**.

Save as

A program can be saved with a different name from the one it had at the outset. This may be useful if you do not wish to lose the changes made to a program, but you neither wish to change the program loaded (various programs can be obtained with different corrections). Comply with the following procedure:

- press the 

key to access the menu;
- select the **[*Save as*]** item;
- enter the new program's name in the window that appears.
- after having entered the name, go to the **[Confirm]** button and press **[ENTER]**.

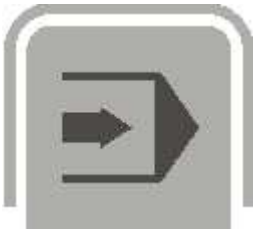
The following descriptions in the manual concern a round shape. If other shapes are required, the sequence of steps generated will change but all the other instructions will remain valid.

END of CHAPTER

2 Brief Guide section B

2.1 Program execution in the automatic mode

Once a program has been set-up, it can be executed in the automatic mode.

Access the automatic status by pressing the  key.

Automatic mask

The automatic mask contains the current targets of the axes. The program data cannot be edited in the automatic status.
The mask graphically displays the entire step sequence with the step currently being executed selected.

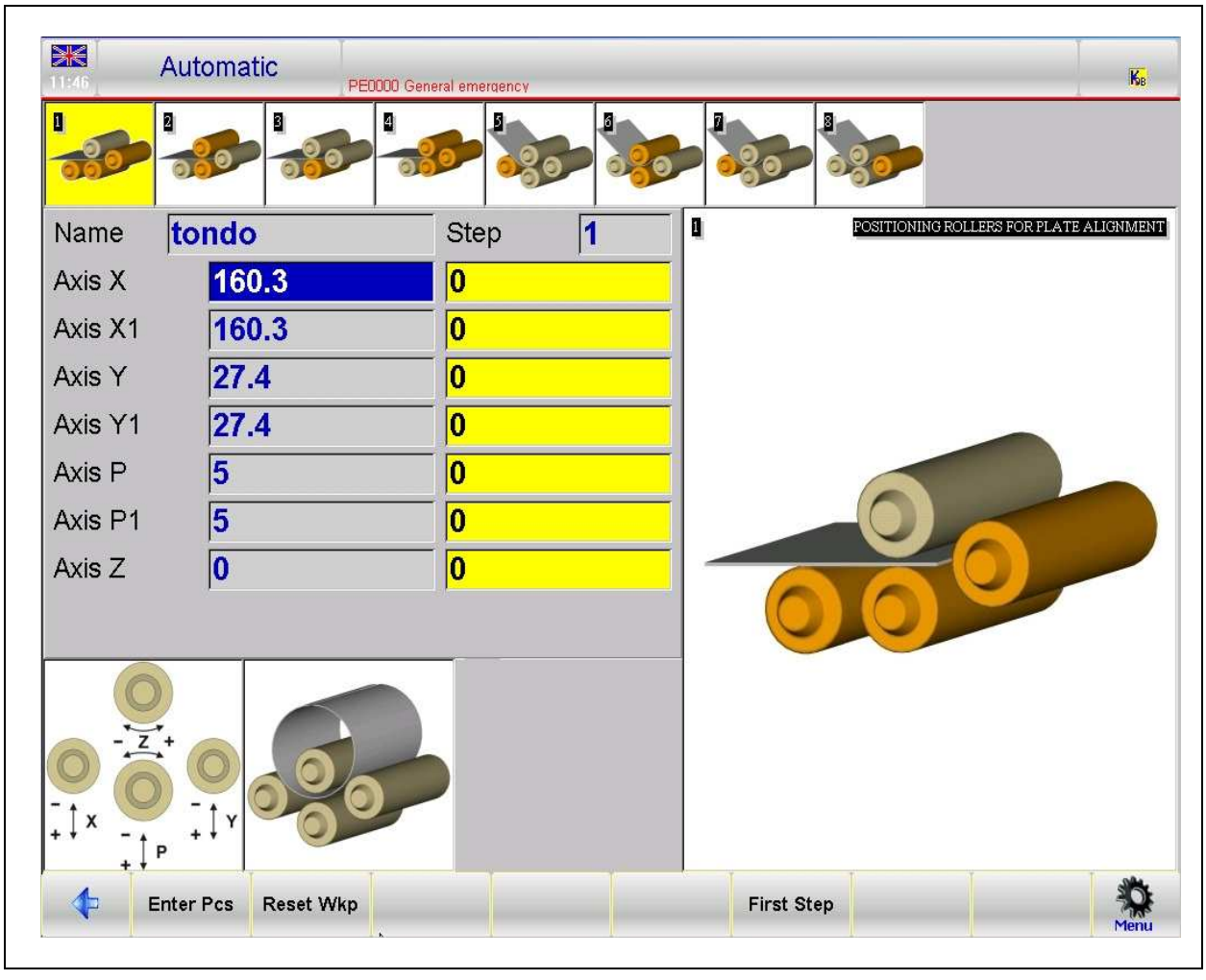


Figure 2.1 – Automatic mask

Automatic cycle execution

Proceed in the following way to begin executing an automatic cycle:

- Press  ; this will allow the axes to begin positioning in the alignment step.
- Press  ; this operation will allow the axes to begin positioning in the crimping step and proceeds with the remaining steps in the automatic mode.
- Once the program has terminated, the automatic cycle starts again from the first step.

Sample workpiece execution

The calculations made by the numeric control are purely theoretic. Owing to the imperfection of the plate, it may be necessary to correct the calculated data.
The targets can be corrected in the 3DAUTOLEARNING mask.
Press **[*PgDn*]** to display a second automatic mask:

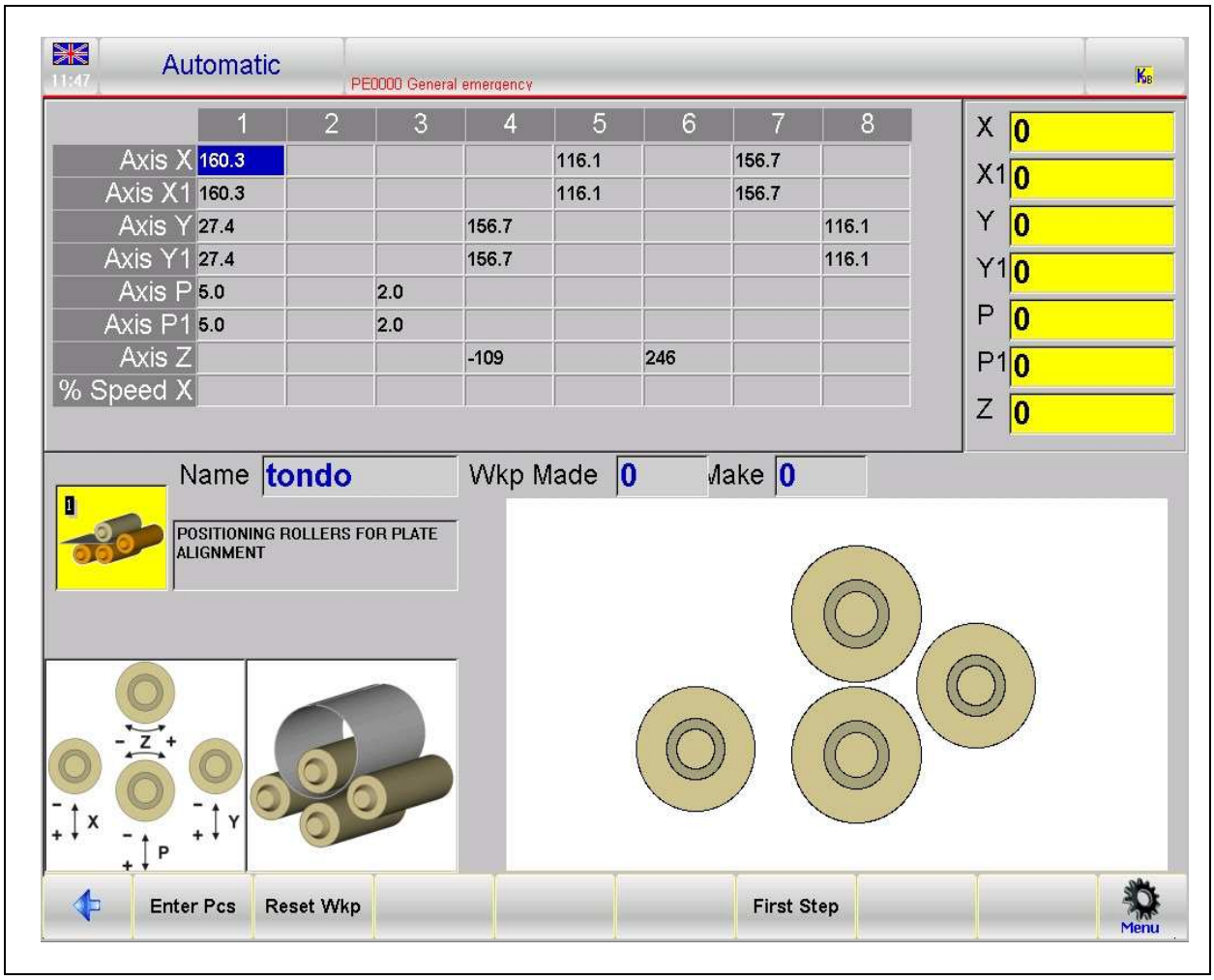


Figure 2.2 – Second automatic mask

This mask displays the current targets of the axes, a numeric representation of the step sequence and a drawing of the step currently being executed. The figure at the bottom right shows the position of the axes according to the targets entered in the current step. The current position of the axes can also be displayed by means of the following procedure:

Display of the current axes position

Displays the current position of the axes:

- press the 

key to access the menu;
- select the **[*Current Targets*]** item.

Press **[*PgUp*]** to go back to the first automatic mask.

2.1.1 Automatic mask with supports and turret

If the supports and turret are installed, the two automatic masks will change so as to display the targets of the further axes.

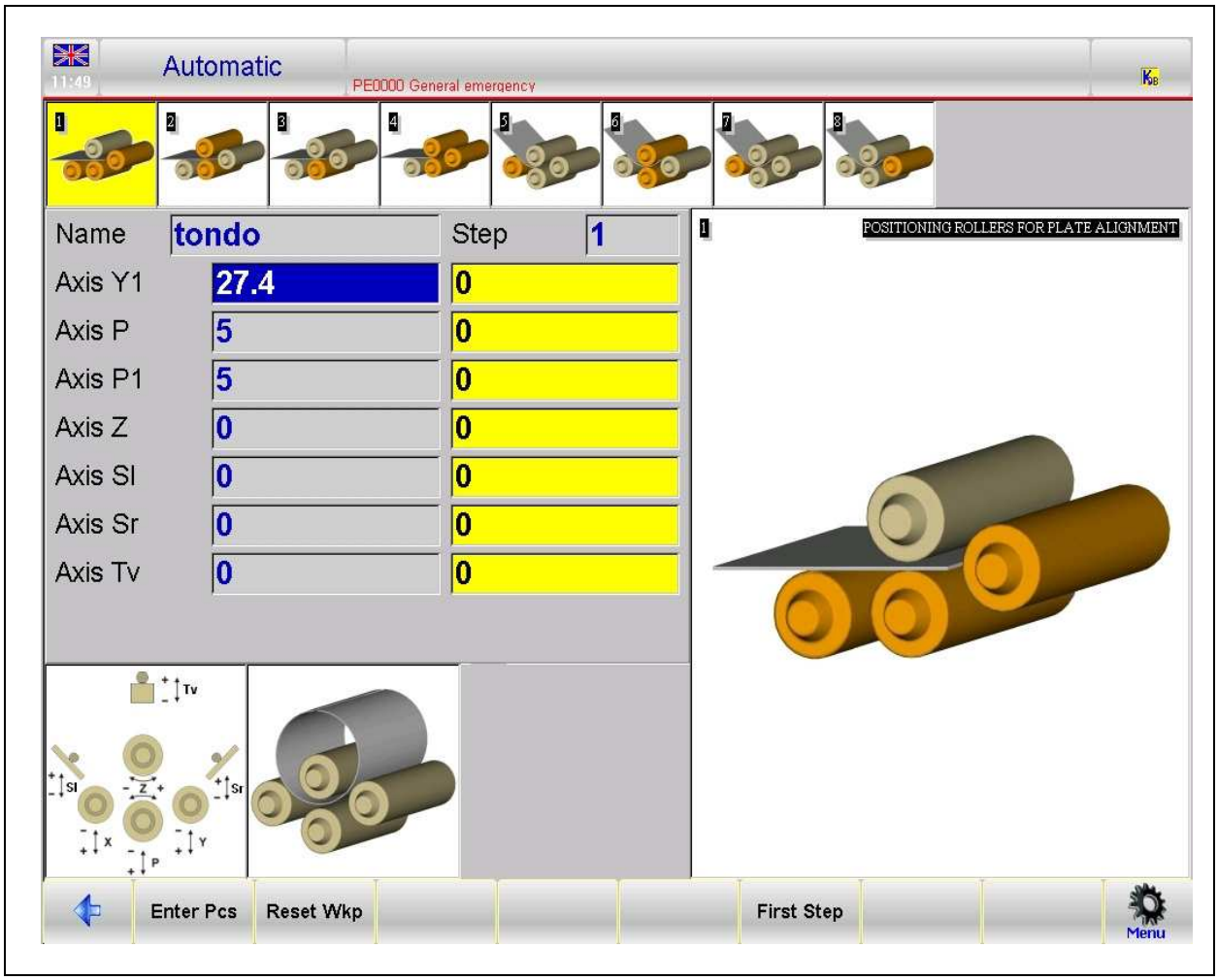


Figure 2.3 - Automatic mask with supports and turret

Figura 2.4 – Second automatic mask with supports and turre

2.2 Autolearning

This status is accessed by pressing . It allows one or more targets in a program step to be learnt after the axis or axes have been positioned at the actual targets required.
An entire program can also be learnt.

2.2.1 Learning

If a program has been calculated by pressing the **[*Calculate*]** key from the settings mask, you will have now accessed the 3D Autolearning mask.

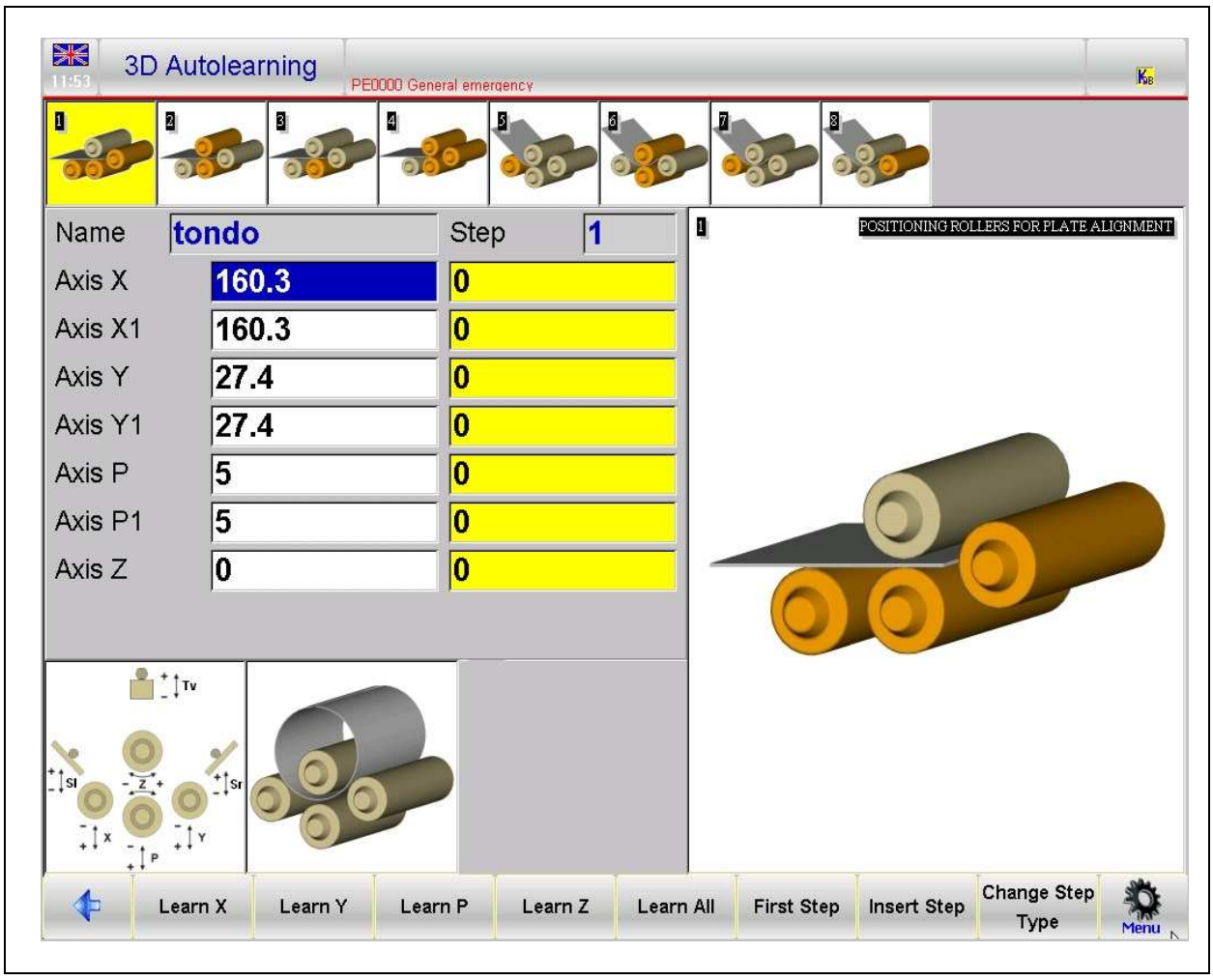


Figure 2.5 – Mask showing Auto Learning in the STOP status

This mask is the same as the automatic mask, the only difference being that the axes targets can be changed when the machine is in the **STOP** status. This will allow you to enter the final targets of the axes yourself, and to change them in relation to the calculated values.

X,X1 setting

If the machine has two axes for the left roller, then the fields of both axes will be displayed and the settings can be entered for both. When the value of X is changed, the value of X1 will be changed as a consequence in order to maintain the same offset between X and X1.

This is also valid for Y,Y1 and P,P1.

Simultaneous axes start enabling

Enables or disables simultaneous starting of the Z rotation axis along with axes X and Y when in the STOP status of a step:

- move with the arrows until you reach the **P.S.** field;
- enter 1 or 0, depending on whether you wish to enable or disable the function.

Bracket opening enabling

Used to enable or disable, when in the STOP mode, bracket opening at the end of the step:

- move with the arrows until you reach the **Bracket** field;
- enter 1 to open the bracket at the end of the step.

Pause entry

Allows you to enter a pause at the end of the current step during automatic execution of a workpiece. START must be enabled in order to continue with the step.

- move with the arrows until you reach the **Pause** field;
- enter 1 if you wish to enable the pause.

Axes X, Y and Z speed entry

Allows the speed of the axes to be entered as percentage of the maximum speed:

- go to the **X Speed %** or **Y Speed %** or **Z Speed %** field, depending on the speed that needs to be entered**;**
- enter the required percentage. If the axis is the two-speed kind, entry of a value differing from 100 means making the axis function at the lower speed.

When **START** is enabled, the above mentioned fields switch to the reading only mode, thus the auto learning mask assumes the following aspect:

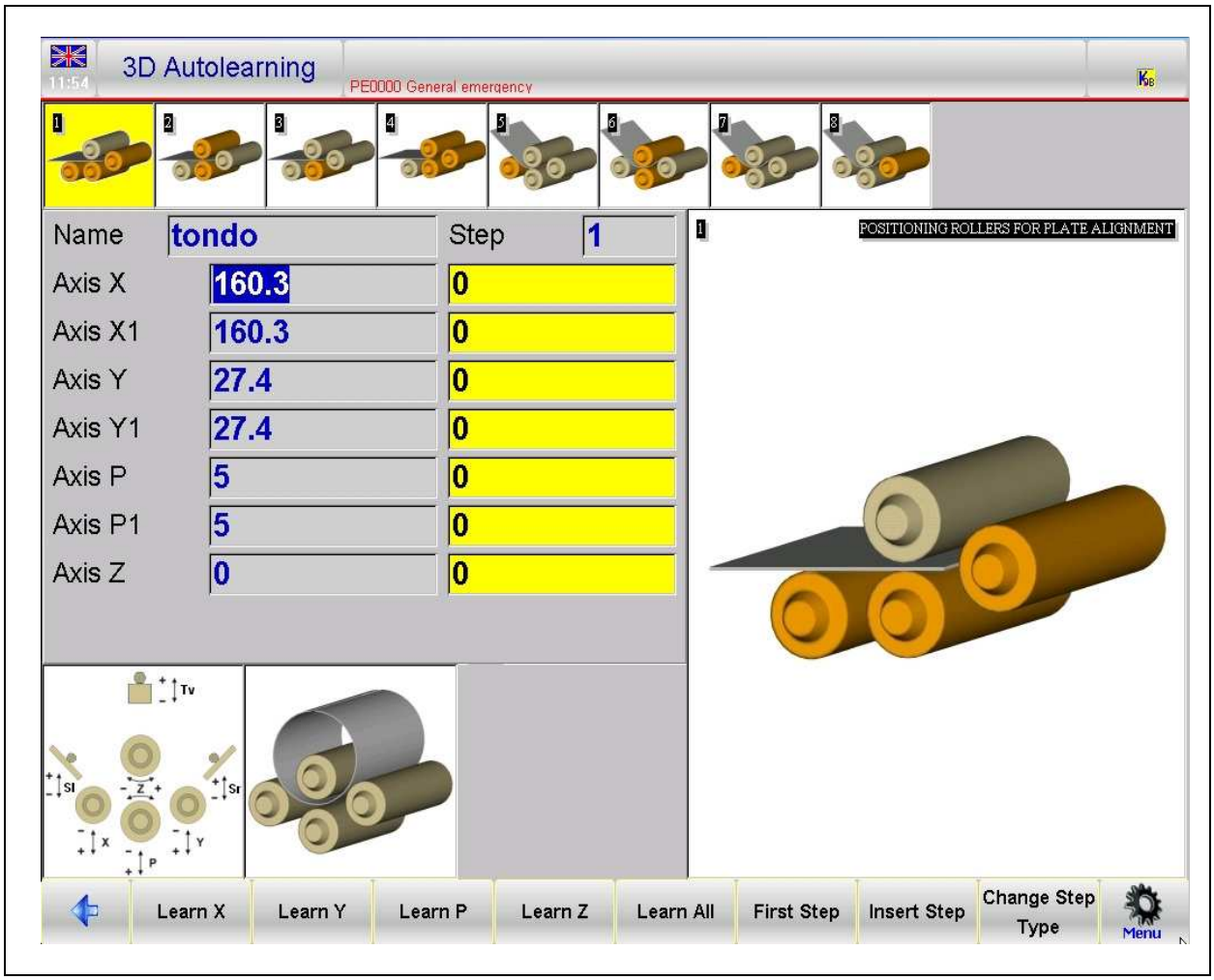
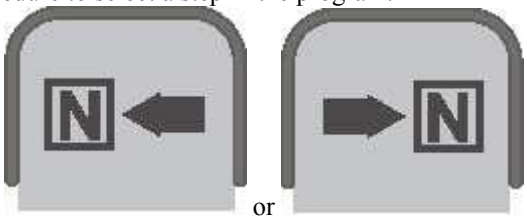


Figure 2.6 – Mask showing Auto Learning in the START status

Step selection

Comply with the following procedure to select a step in the program:

Go to the required step with the  keys.

Change Step Type

To modify the selected step:

- go to the step that needs changing
- Press the **[*Change Step Type*]** function key.
- select the required step;
- just press **[ENTER]** or the **[*Select Step*]** function key to confirm.

The selected step will replace the previous one.

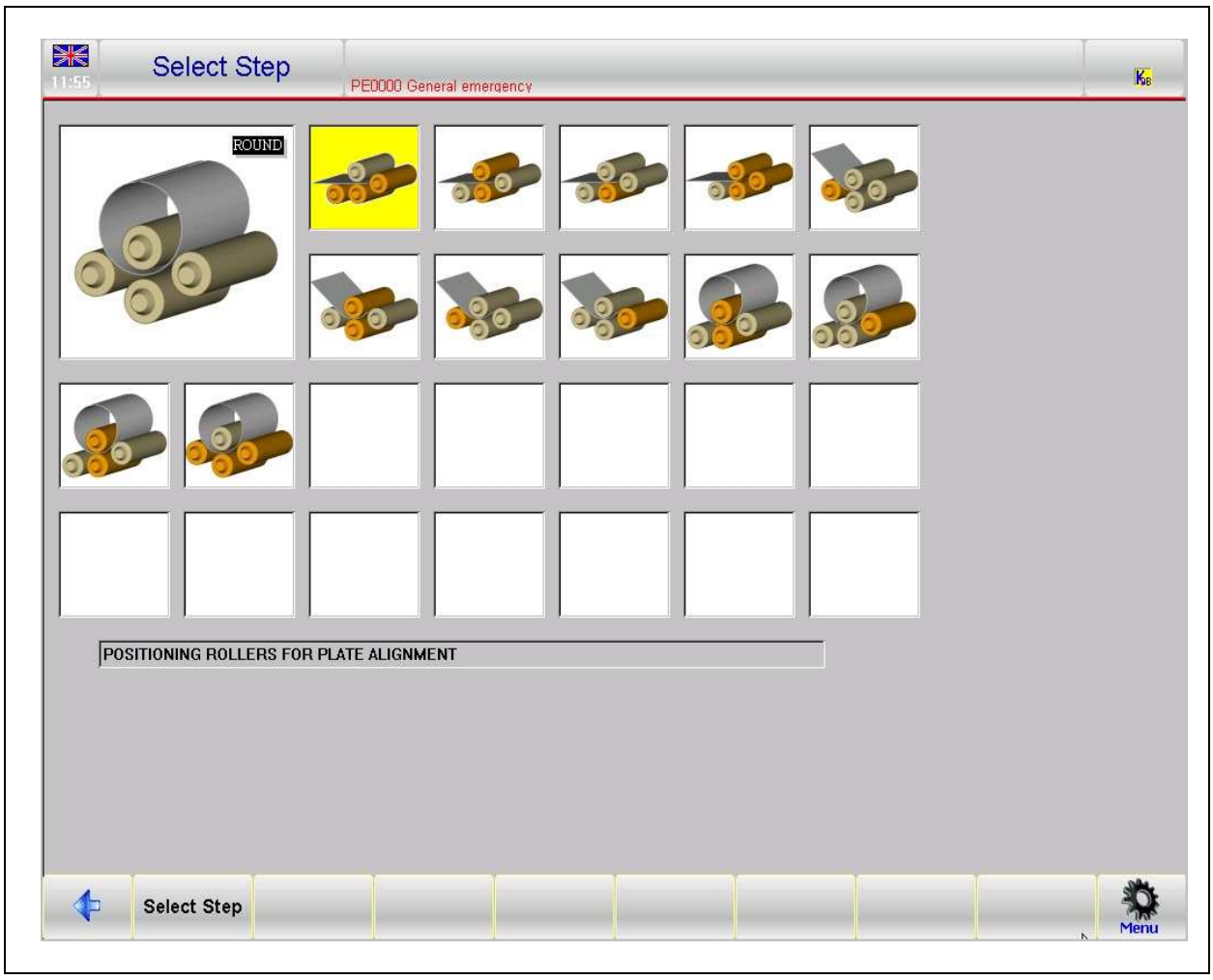


Figure 2.7 – Step selection mask

Step entry at the end of a program

Enters a step at the end of a program

- go to the last step with the step selection procedure;
- press the key  ; a step called ***free*** will be added;
- comply with the **Change step type** procedure.

Step entry

Go to the step after the one to be inserted and comply with the following procedure:

- select the **[*Enter Step*]** function key. The step will be inserted before the one on which you had positioned. A step of the ***free*** type will be inserted and the axes targets will be the same as those of the step that precedes it.

First step positioning

Used for going to the first step in the program:

- Press the **[*First Step*]** function key.

Copy step

Used for copying a step:

- go to the step you wish to copy with the step selection procedure;
- press the 

key to access the menu;
- select the ***Copy Step*** item.
- go to the step on which you wish to copy with the step selection procedure;
- press the 

key to access the menu;
- select the ***Paste Step*** item. The step created will be the ***free*** type;

Step deletion

Deletes a program step:

- go to the step you wish to delete with the step selection procedure;
- press the  key;

Preset step data entry

Modifies the alignment target and the crimping target:

- press the 

key to access the menu;
- select the ***Preset Step Data*** item.
- the following window will appear:

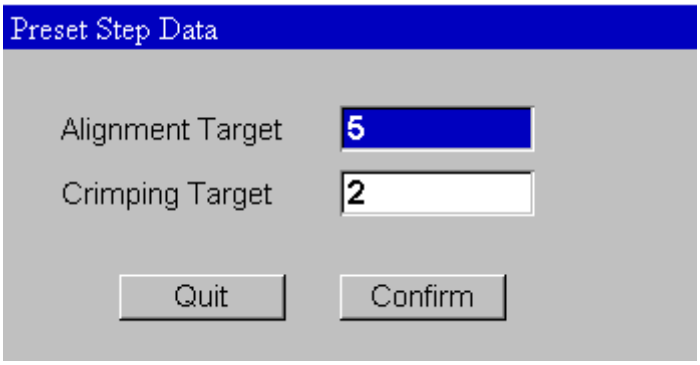


Figure 2.8 - Preset step data window

- enter the data and press **Confirm**. The alignment and crimping targets will be changed in all the program steps;

Additional step data entry

Used for entering certain additional step data:

- go to the step in which the data are to be entered using the step selection procedure;
- press the 

key to access the menu;
- select the ***Additional Step Data*** item.
- the following window will appear:

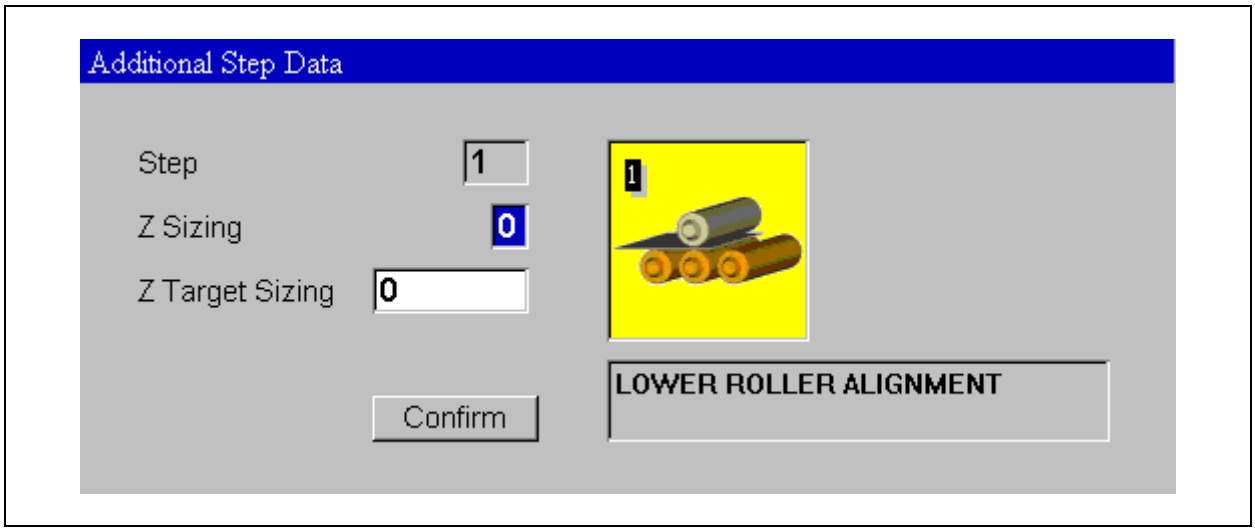


Figure 2.9 - Additional step data window

- enter 1 for the ***Z Sizing*** field if you wish to size Z automatically at the end of the step;
- enter the new sizing target in the ***Z Sizing Target*** field;
- press ***Confirm***;

Learning a step

Allows all the targets of a step to be learnt:

- position the axes at the required targets
- press the **[*Learn All*]** function key

How to learn a single axis

Allows the target of an axis in a step to be learnt:

- position the axis at the required target;
- press the Learn X or Y or P or Z function key, depending on the axis to be learnt. If the special parameter **0=Learn X(Y) 1=Learn X(Y)** and **X1(Y1)** is 1, the value of X1 (or Y1 or P1) will also be learnt when X (or Y or P) is learnt.

Press the 

key to access the menu and select the corresponding item in order to learn the targets of X1, Y1 and P1.

If the special parameter ***Eb. Add. Step with learn*** is 1, a step is automatically added and the program will go to it when learning is accomplished on the last step of the program.

If the case of a free shape, the **[*Learn All*]** is enabled on the first step only and can only be used once. When executed, besides learning, two additional steps are added to the program and the PAUSE flag is set in the second step.

Geometric target and correction display

Opens a dialog window displaying the geometric target calculated by the NC for the machining roller and the correction for this same roller, if any.

- press the 

key to access the menu;
- select the ***Geometric Target***. The following dialog window will appear;

Figure 2.10 – Geometric target and correction display window

Press **[*PgDn*]** to display a second autolearning mask:

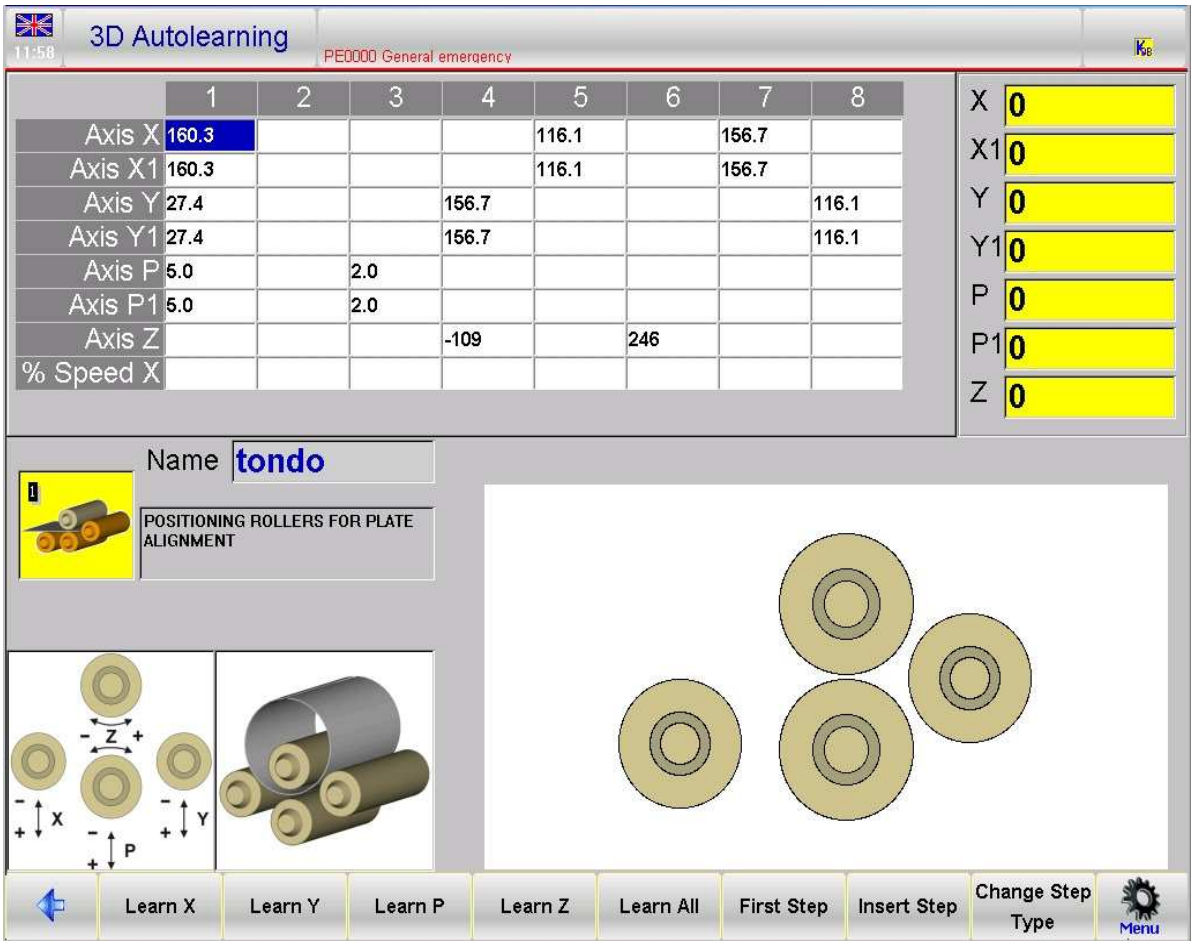


Figure 2.11 – Mask showing Auto Learning in the STOP status

This page is also the same as the second automatic page. In the STOP status, the table that described the steps can be edited. The table can no longer be edited when it is in the START status:

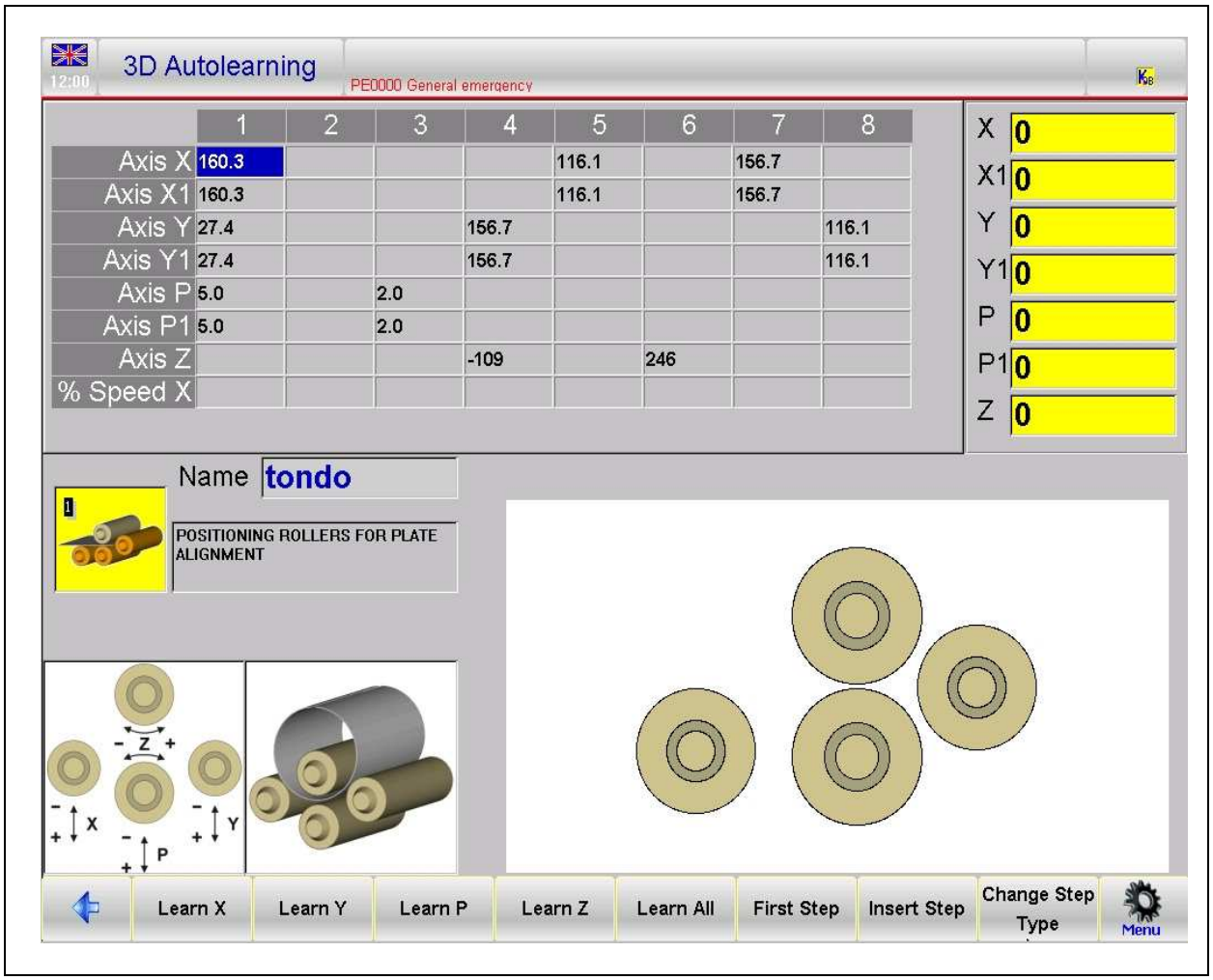


Figure 2.12 – Mask showing Auto Learning in the START status

All the functions described for the first autolearning page are valid in this page.
Press **[*PgUp*]** to go back to the first autolearning mask.
If the special parameter **Shortcut keys in Self-learning** is 1, the learning function keys are replaced by function keys for changing the speed override, as shown in the figure:

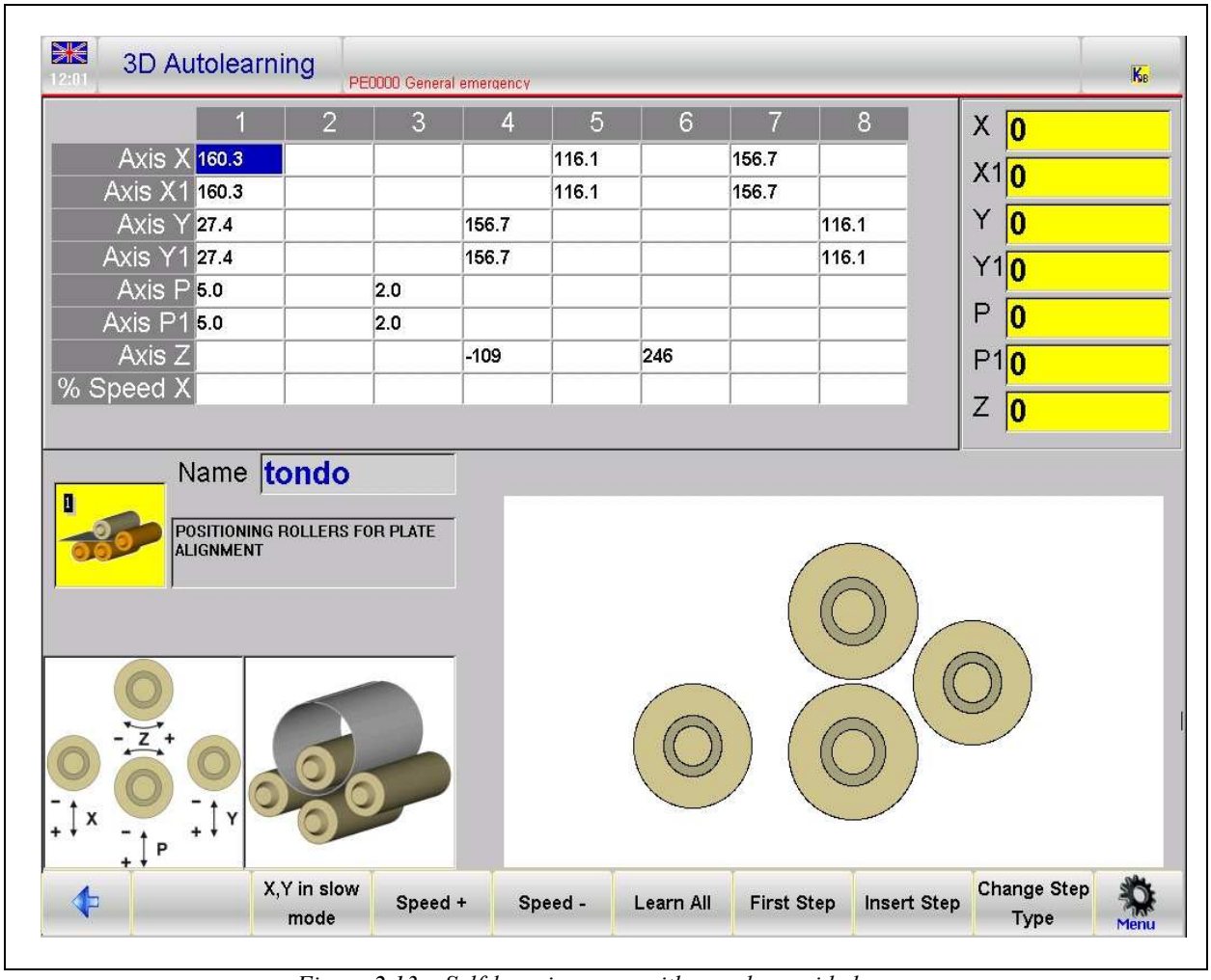


Figure 2.13 – Self-learning page with speed override keys

2.2.2 Learning masks with supports and turret

The first autolearning mask will be like the one below if the machine has the side supports and turret:

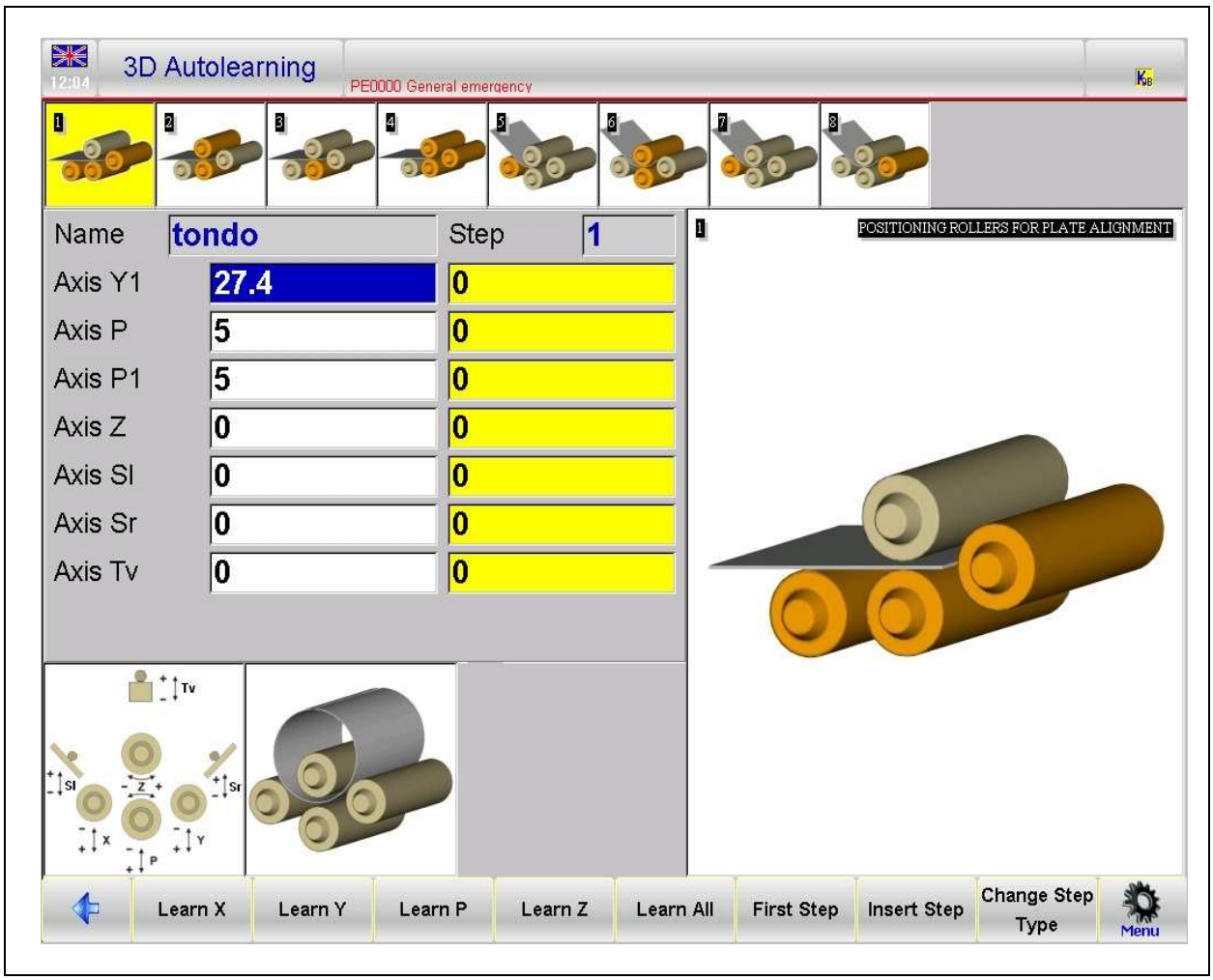


Figure 2.14 - Autolearning mask with supports and turret

Move with the arrows amongst the fields to display all the fields in the mask.

No stop rotation enabling

If enabled, switches to the next step without stopping the rotational movement:

- go to the **Non Stop Z** field;
- enter 1 or 0, depending on whether you wish to enable or disable the function.

Learning a support or turret axis

Allows the target of a support or turret axis in a step to be learnt:

- position the axis at the required target;

- press the  key to display the secondary menu;
- press the **Learn Sl** or **Sr** or **Tv** function key, depending on the axis to be learnt.

The second autolearning mask will be like the one depicted below:

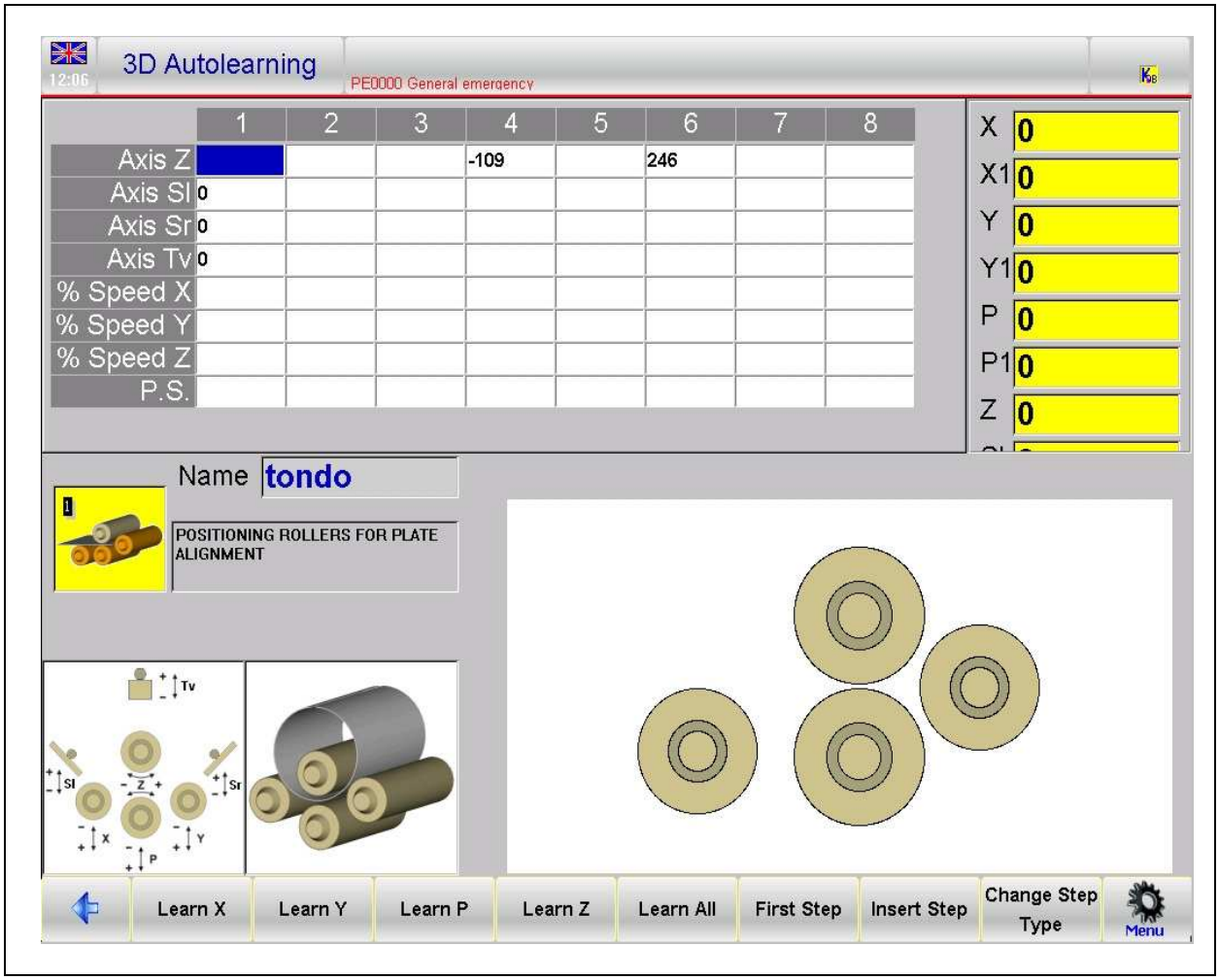
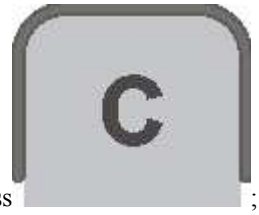


Figure 2.15– Second autolearning mask with supports and turret

2.3 Corrections page

Comply with the following procedure to access the corrections page:

- press 

;
- the following window will appear:

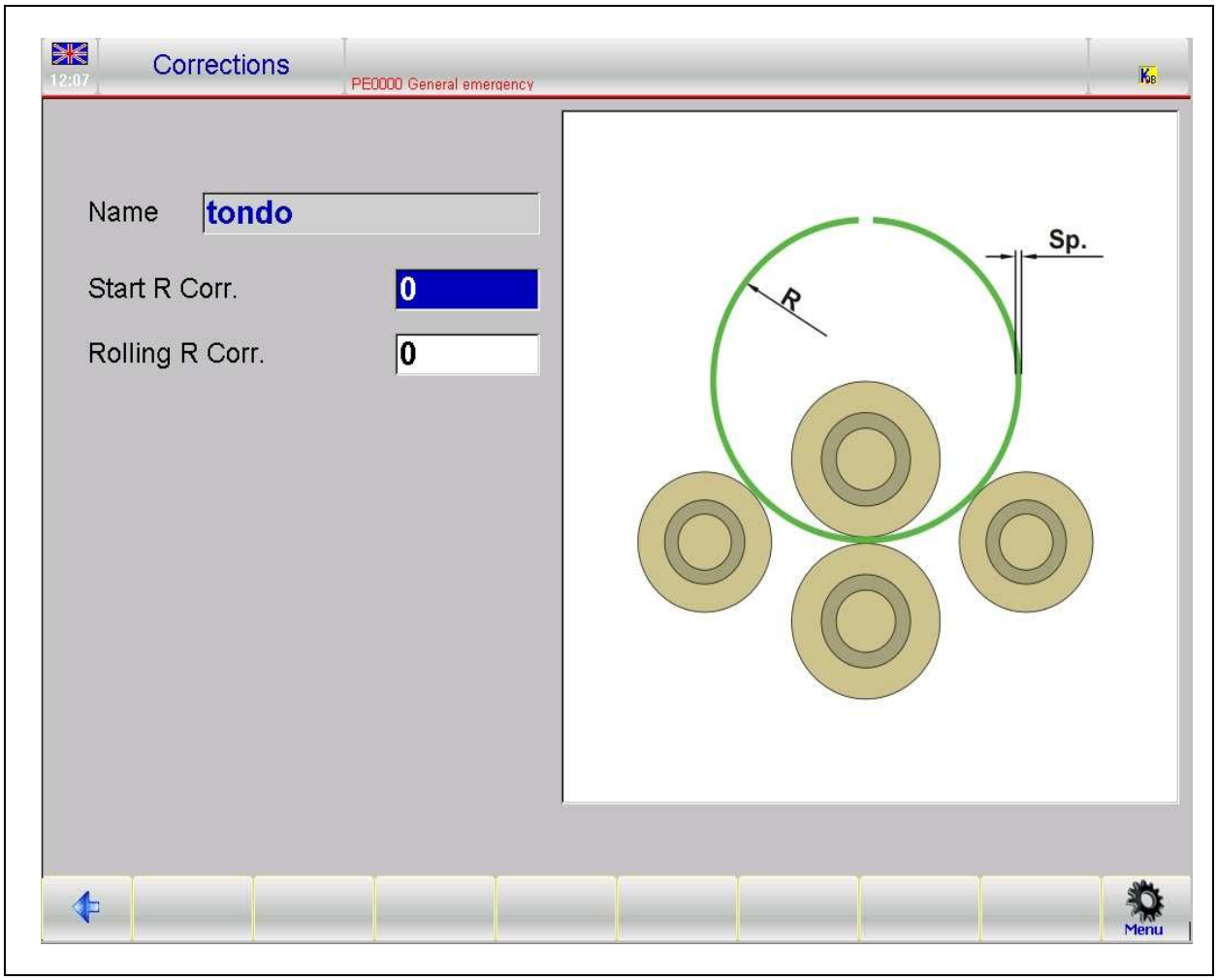


Figure 2.16 – Corrections page

The correction values, that will add to the calculated targets, can be entered in this page.
The correction for the entrance steps must be entered in the ***Entrance Corr.*** field.
The correction for the rolling steps must be entered in the ***R Rolling Corr.*** field. The corrections will be applied to the program once the corrections page has been quitted.

2.4 Selection of the backup unit

Allows the backup unit to be selected.
Comply with the following procedure to display the selection window:

- press the 

key twice from the Settings mask to access the system menu;
- select the ***Configure*** item.
- enter the password, if requested;
- press the 

key and select the ***Backup Unit*** item: the following window will appear:

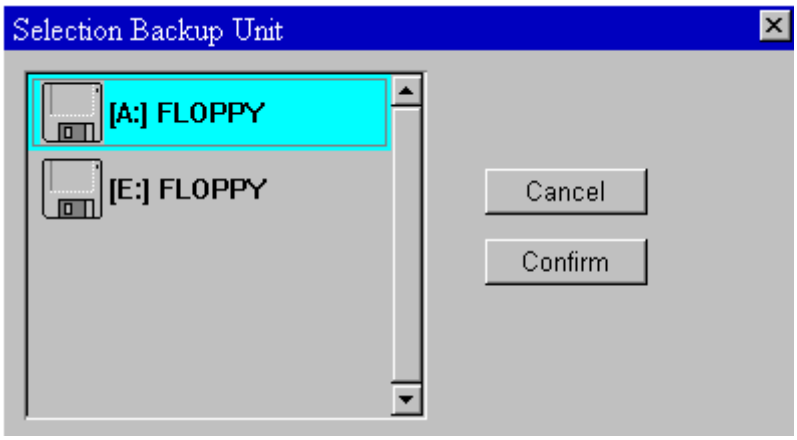


Figure 2.17– Backup unit selection window

the floppy disk and the USB units are displayed. Select the required unit and press **Confirm**

END OF CHAPTER

3 NC memorized data management

3.1 Introduction

Type of data

KVARA numeric controls for calenders contain certain categories of data that are of basic importance for operation:

- System parameters (Menu 2)
- Configuration parameters (Menu 1)
- Machining programs
- Calender geometry
- Table of % material corrections
- Material correction table (database)
- Interpolation table
- Table of support/turret targets (only valid in machines with the supports and turret)

3.2 Storage devices

These data can be memorized in the following storage devices:

- Flash
- Buffered RAM
- SSD (Solid State Disk) Flash Hard Disk
- Backup unit

3.2.1 Flash

This is the device that resides on the MULTIFUNCTION board in which the management software of the machine movements and its operating system are stored.

3.2.2 Internal memory (buffered RAM)

This is the storage device of the numeric control (it resides on the MULTIFUNCTION board) into which all the machine data are downloaded before being used. Thanks to the battery, these data are also maintained even when the numeric control is off.

3.2.3 SSD (Flash Hard Disk)

This is the storage device that contains a copy of the operating system, the Kvara application program and its Backup copy, as well as the data saved by the Kvara application program (machine data, programs and geometry).

3.2.4 Backup Unit

Can be a normal 1.4 Megabyte 3½ inch diskette or a USB key for backup support.
This is used for saving the machine's configuration parameters and for the system parameters. It is used for saving a security copy of the programs, geometry.

The contents of the backup support can be viewed with any IBM-compatible Personal Computer.

3.3 Logic data location

Foreword

Logic data location means the storage device in which they reside on powering.

At the time they are used, all data reside in the internal memory.

Brief table

Type of data item	Storage device
System parameters	Internal Memory + SSD
Configuration parameters	Internal Memory + SSD
Machining programs	SSD
Material correction table (database)	SSD
Table of % material corrections	SSD
Interpolation table	SSD
Table of support/turret targets	SSD
Geometry	SSD

Files associated with the data

All the machine data are memorized in files so that they can be recalled following an incorrect setting or loss of memory.

3.4 Data exchanges between storage devices

Data exchanges means moving data from the internal devices to the backup unit (SAVE) or from the backup unit to the internal storage devices (LOAD).
All the data handled by the KVARA program and listed in the previous sections can be Loaded and/or Saved according to the following schematizations:

SYSTEM AND CONFIGURATION PARAMETERS

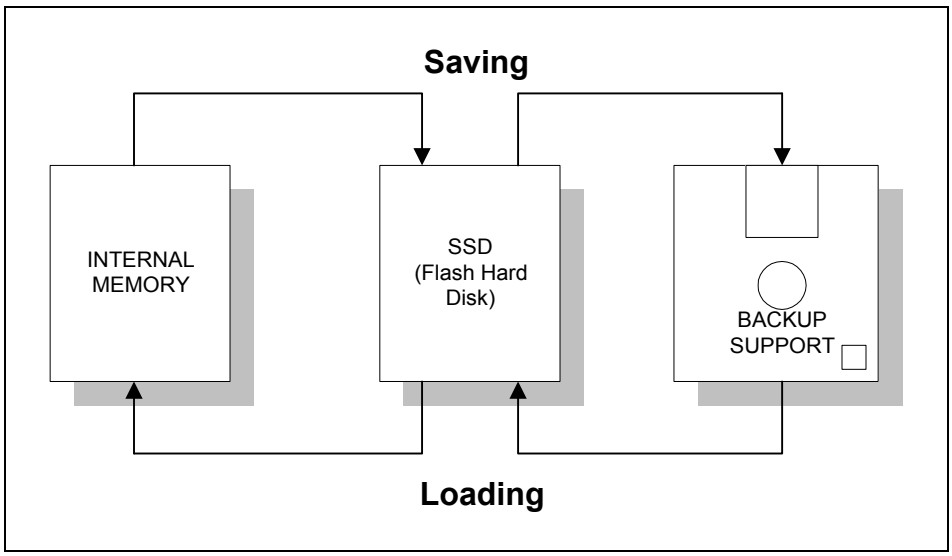


Figure 3.1 – Saving/Loading SYSTEM AND CONFIGURATION PARAMETERS

PROGRAMS, GEOMETRY AND MATERIAL CORRECTION TABLE, TABLE OF % MATERIAL CORRECTIONS, INTERPOLATION TABLE AND TABLE OF SUPPORT/TURRET TARGETS

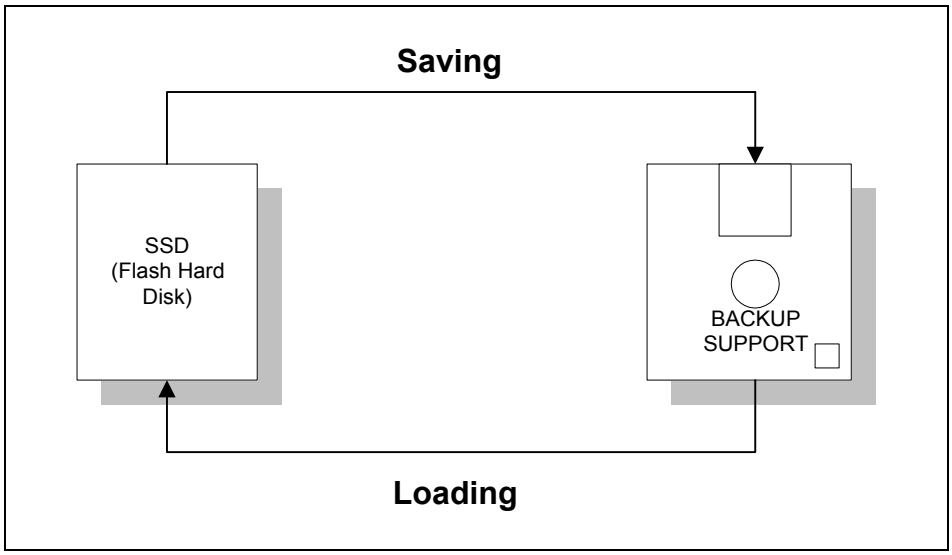


Figure 3.2 – Saving/Loading PROGRAMS, GEOMETRY and MATERIAL CORRECTION, TABLE OF % MATERIAL CORRECTIONS, TABLES INTERPOLATION TABLE AND TABLE OF SUPPORT/TURRET TARGETS

As can be seen in the figure, the files are first memorized in the SSD and then transferred to the destination device when the configuration parameters of the machine and the system parameters are loaded/saved. This means that if one of the storage devices (Backup support) operates in a faulty way, there is always a copy (SSD) of the last operation involving the data.

The machine's configuration parameters and the system parameters can be saved and/or load automatically and at the same time. This particular function is described in the "Save/Load all parameters" section.
The loading and saving operations of each category of data are described below:

3.4.1 Save / Load the System and Configuration Parameters

The system configuration parameters consist of the following data:

Description	Type (name on the screen)	File name
System parameters	Parameters Editor	PAR.DAT
Special parameters	Special parameters	SPEC.PAR
Generic parameters	Generic parameters	GENER.PAR
Generic parameters 2	Generic parameters 2	GENER2.PAR
Material correction table (database)	Kvara Database	KDB files
Table of % material corrections	Material.Corr	TABMATERIALI.PAR
Interpolation table	Interpolation Tab.	Interptab.par
Table of support/turret targets	Support/turret tab.	Tarsupptab.par
Geometry	GEOMETRY	GEOMETRICI.PAR

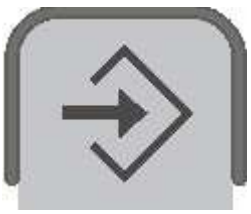
Loading and/or saving can be carried out in one of the following ways:

- SINGLE saving/loading: the type of parameter selected is subjected to the operation;
- GLOBAL saving/loading: all types of configuration parameters are subjected to the operation.

Comply with the instructions given in the dedicated chapter for the material correction Table.

Single saving

Proceed in the following way to save only the configuration parameters:

1) Select the Configure **1** Menu;
2) select the type of parameters that need to be saved (key **1** or **5**) by accessing the corresponding mask;
3) press  to save the file containing the selected data on backup unit;

Example

The following example illustrates the procedure required for saving the SPECIAL PARAMETERS configuration parameters. To save the other types of parameter, repeat the procedure but select the type of data to be saved.

a) Select the Configure **2** Menu;

b) press **1**;

c) press  .

Single loading

Proceed in the following way to save only one type of configuration parameter:

1) Select the Configure **1** Menu;

2) select the type of parameters that need to be loaded (key **1** or **5**) by accessing the corresponding mask;

3) press **[*Loading from Disk*]** to load the file containing the selected data from backup unit.

Global saving

Proceed in the following way to save all the configuration parameters on backup unit:

1) Select the Configure **1** Menu;

2) press **[*Save All*].**

Global loading

Proceed in the following way to load all the configuration parameters from the backup unit:

1) Select the Configure **1** Menu;

2) press **[*Load All*].**

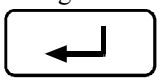
3.4.2 Save/Load programs

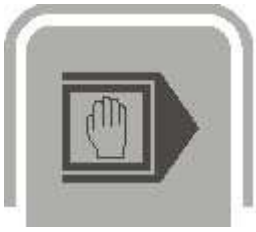
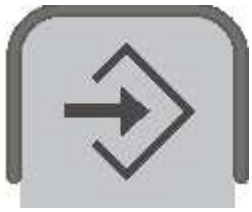
Foreword

The programs consist of a file:

- filename.PRN containing the axes targets and step data.

Description	Name displayed	File name
Numeric program	filename	filename PRN

The program data reside in the SSD and do not require specific loading and saving procedures to be edited. After having selected the program, just press  .

Type of program	Data editing
Numeric programs	• press  to access the numeric data of the workpiece; • press  to memorize the edited data; • re-select the name of the program from the program list again to lose all the modifications made.

How to save the current program on backup unit

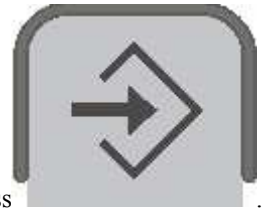
Proceed as follows to save the currently selected program on backup unit:

1) press  from the SETTINGS mask;

How to save a program on backup unit

Proceed in the following way to save any of the programs on SSD backup unit:

1) press 

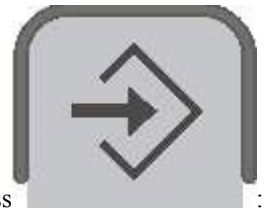
to select the list of programs;
2) move with the cursor to the program you wish to save;
3) press  .

How to load a program from backup unit

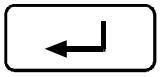
To load a program from the backup unit:

1) press 

to select the list of programs;
2) press 

to select the list on backup unit;
3) select the program you wish to load;
4) press  : the program will be copied from the backup unit into the SSD;

5) The newly copied program should be present when 

is pressed again (list in SSD). To access the program, just select it and press  to load it.

3.4.3 Save/Load all programs

Saving on backup unit

Proceed in the following way to save all the programs on backup unit:

1) press 

to select the list of programs;

2) press the 

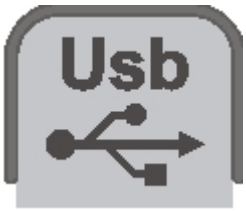
key to access the menu and select **[*Save programs*]**. All the programs will be saved on backup unit.

Loading from backup unit

Proceed in the following way to load all the programs from the disk:

1) press 

to select the list of programs;

2) press 

to display the list of programs on the backup unit;

3) press the key 

to access the menu and select **[*Save programs*]**. All the programs will be loaded from the backup unit.

3.5 Recommended security savings

Foreword Security saving means storing data allowing the calender to operate, on backup support.

Parameters Security saving of parameters must be carried out at the time of dispatch. Any successive changes must be saved immediately.

Programs Security saving of programs must be carried out periodically by the customer depending on the number or importance of the programs used.

Geometry Security saving of the geometry must be carried out after all the machine geometry data have been entered.

3.5.1 Recommendations for the calender manufacturer

It is advisable to keep:

- a backup support containing the machine parameters of each calender sold (in duplicate, or a copy on the hard disk of a personal computer).

3.5.2 Recommendations for the end user

It is advisable to keep:

- a backup support containing a copy of all the machine parameters and programs commonly used in the numeric control;
- a storage backup support identical to the one described above;
- a copy of the machine parameters in the hard disk of a Personal Computer;
- a backup support containing the programs of each individual customer so as to keep as much of the memory vacant as possible and to allow search phases to be carried out in a faster way (this diskette is only required if a large number of programs is involved).

END OF CHAPTER

4 Description of the program data

4.1 Data in the general data mask

Thickness		
Minimum value: **0.01**		Maximum value: **99.99**
Default value: **0**		Meas. unit: **mm**
Available from SW version **1.0**		Change activated **data input**
Description:	Indicates the plate thickness.	

Width		
Minimum value: **0.01**		Maximum value: **99999.99**
Default value: **0**		Meas. unit: **mm**
Available from SW version **4.0**		Change activated **data input**
Description:	Indicates the plate width.	

Material		
Minimum value:		Maximum value:
Default value: **-1**		Meas. unit: **pure number**
Available from SW version **4.0**		Change activated **data input**
Description:	Indicates the material: a list with the materials in the material corrections table is displayed and can be used to choose the material.	

Enable Right Steps		
Minimum value: **0**		Maximum value: **1**
Default value: **0**		Meas. unit: **pure number**
Available from SW version **1.0**		Change activated **data input**
Description:	Use 0 to select step creation with infeed from the left. Use 1 to select step creation with infeed from the right.	

% Thickness for Crimping		
Minimum value: **0**		Maximum value: **100**
Default value: **100**		Meas. unit: **pure number**
Available from SW version **6.0**		Change activated **data input**
Description:	Indicates the thickness percentage for the crimping target calculation.	

4.2 Data in the settings masks

These data allow the step sequence to be created:

Name	
Minimum value:	Maximum value:
Default value:	Meas. unit: **alphanumerical characters**
Available from SW version **1.0**	Change activated
Description:	This is the name of the program currently in use. If nothing is written in the field, the program is the temporary type and has not yet been saved.

R,R1,R2,R3,R4,R5,R6,R7,R8,R9,R10	
Minimum value: **0.01**	Maximum value: **100000.0**
Default value: **0**	Meas. unit: **mm**
Type of data: **unsigned char**	Protection level:
Available from SW version **1.0**	Change activated **data input**
Description:	Indicate the radii that describe the shape to be made.

L1,L2,L3,L4,L5,L6,L7,L8,L9,L10	
Minimum value: **0.01**	Maximum value: **100000.0**
Default value: **0**	Meas. unit: **mm**
Type of data: **unsigned char**	Protection level:
Available from SW version **1.0**	Change activated **data input**
Description:	Indicate the straight lines that describe the shape to be made.

L R1-R2 (L9)	
Minimum value: **0.01**	Maximum value: **100000.0**
Default value: **0**	Meas. unit: **mm**
Type of data: **unsigned char**	Protection level:
Available from SW version **4.2**	Change activated **data input**
Description:	Indicates the length of the union between straight-line sections with radius R1 and R2.

L R2-R3 (L10)			
Minimum value: **0.01**		Maximum value: **100000.0**	
Default value: **0**		Meas. unit: **mm**	
Type of data: **unsigned char**		Protection level:	
Available from SW version **4.2**		Change activated **data input**	
Description:	Indicates the length of the union between straight-line sections with radius R2 and R3.		

A1,A2,A3,A4			
Minimum value: **0.01**		Maximum value: **360**	
Default value: **0**		Meas. unit: **degrees**	
Type of data: **unsigned char**		Protection level:	
Available from SW version **4.2**		Change activated **data input**	
Description:	Indicate the angles corresponding to the various straight-line sections that describe the figure		

Enable Double Entrance			
Minimum value: **0**		Maximum value: **1**	
Default value:		Meas. unit: **pure number**	
Available from SW version **1.0**		Change activated **data input**	
Description:	Only valid for rounds. use 0 to select the sequence with single entrance. use 1 to select the sequence with double entrance.		

Length			
Minimum value: **0**		Maximum value: **99999**	
Default value: **0**		Meas. unit: **mm**	
Available from SW version **1.0**		Change activated **data input**	
Description:	The length of the plate.		

4.3 Data in the autolearning mask

Step	
Minimum value: **1**	Maximum value: **80**
Default value:	Meas. unit: **pure number**
Available from SW version **1.0**	Change activated
Description:	This is the currently executed step.

X axis	
Minimum value: **--9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the position that X axis must reach for the left-hand roller.

X1 axis	
Minimum value: **--9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **6.6**	Change activated **data input**
Description:	This is the position that X1 axis must reach for the left-hand roller.

Y axis	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the position that Y axis must reach for the right-hand roller.

Y1 axis	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **6.6**	Change activated **data input**
Description:	This is the position that Y1 axis must reach for the right-hand roller.

P axis	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the position that P axis must reach for the crimping roller.

P1 axis	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **7.6**	Change activated **data input**
Description:	This is the position that P1 axis must reach for the crimping roller.

Z axis	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the position that Z axis must reach to turn the upper roller.

The following data will also be present if the machine also has the side supports and turret:

Sl axis	
Minimum value: **0**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **5.0**	Change activated **data input**
Description:	This is the position that the Sl axis must reach for the left-hand support.

Sr axis	
Minimum value: **0**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **5.0**	Change activated **data input**
Description:	This is the position that the Sr axis must reach for the right-hand support.

Tv axis	
Minimum value: **0**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **5.0**	Change activated **data input**
Description:	This is the position that the Tv axis must reach for the vertical turret.

Non Stop Z	
Minimum value: **0**	Maximum value: **1**
Default value: **0**	Meas. unit: **pure**
Available from SW version **5.0**	Change activated **data input**
Description:	Enables/disables the continuity of the rotational movement in the passage from the current step to the next step.

P.S.	
Minimum value: **0**	Maximum value: **1**
Default value: **0**	Meas. unit: **pure**
Available from SW version **1.0**	Change activated **data input**
Description:	If the setting is 1, rotary Z axis moves in this step along with X and Y.

Bracket	
Minimum value: **0**	Maximum value: **1**
Default value: **0**	Meas. unit: **pure**
Available from SW version **1.0**	Change activated **data input**
Description:	Enables/disables bracket opening at the end of the step.

Pause	
Minimum value: **0**	Maximum value: **1**
Default value: **0**	Meas. unit: **pure**
Available from SW version **4.0**	Change activated **data input**
Description:	Enables/disables the pause at the end of the step. In the automatic mode, START is required to allow the cycle to proceed.

X Speed %	
Minimum value: **0**	Maximum value: **100**
Default value: **100**	Meas. unit: **pure**
Available from SW version **4.0**	Change activated **data input**
Description:	X axis speed setting as percentage of the maximum speed. If the axis is the 2-speed type, entry of a value lower than 100 means driving the axis at minimum speed.

Y Speed %	
Minimum value: **0**	Maximum value: **100**
Default value: **100**	Meas. unit: **pure**
Available from SW version **4.0**	Change activated **data input**
Description:	Y axis speed setting as percentage of the maximum speed. If the axis is the 2-speed type, entry of a value lower than 100 means driving the axis at minimum speed.

Z Speed %	
Minimum value: **0**	Maximum value: **100**
Default value: **100**	Meas. unit: **pure**
Available from SW version **4.0**	Change activated **data input**
Description:	Z axis speed setting as percentage of the maximum speed. If the axis is the 2-speed type, entry of a value lower than 100 means driving the axis at minimum speed.

4.4 Preset Step Data

These are data that correct the settings of the workpiece data section and influence the target calculations.

Alignment Target	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the target to which roller P positions in the alignment step. The targets of rollers X and Y are also re-calculated if this target is modified.

Crimping Target	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	This is the P target at which steps differing from the alignment step are generated.

4.5 Additional Step Data

Z Sizing	
Minimum value: **0**	Maximum value: **1**
Default value: **0**	Meas. unit: **pure**
Available from SW version **1.0**	Change activated **data input**
Description:	Enables Z sizing when Z has finished the positioning.

Z Sizing Target	
Minimum value: **-9999.99**	Maximum value: **9999.99**
Default value: **0**	Meas. unit: **mm**
Available from SW version **1.0**	Change activated **data input**
Description:	The new sizing target.

4.6 Workpiece data in the automatic mask

Wkp made	
Minimum value: **0**	Maximum value: **999999**
Default value: **0**	Meas. unit: **pure number**
Available from SW version **1.0**	Change activated **data input**
Description:	Indicates how many workpieces have been made in the currently executed program. The data item is automatically updated during the process, but the user can modify it at his discretion.

Wkp to make	
Minimum value: **0**	Maximum value: **999999**
Default value: **0**	Meas. unit: **pure number**
Available from SW version **1.0**	Change activated **data input**
Description:	Indicates how many workpieces the user wishes to make. The number decreases automatically at the end of each workpiece. The automatic process stops at the end of the last workpiece and the program asks for the START button to be pressed in order to continue.

END OF CHAPTER

5 Table of % material corrections

5.1 General description

This table is used for making corrections to the program steps. These corrections are applied to the geometric targets calculated by the numeric control. These corrections are divided per material.

Comply with the following procedure to access the Table of % material corrections:

- press the 

key twice to access the system menu;
- select the ***Configure*** item;

press **6** to access the following page:

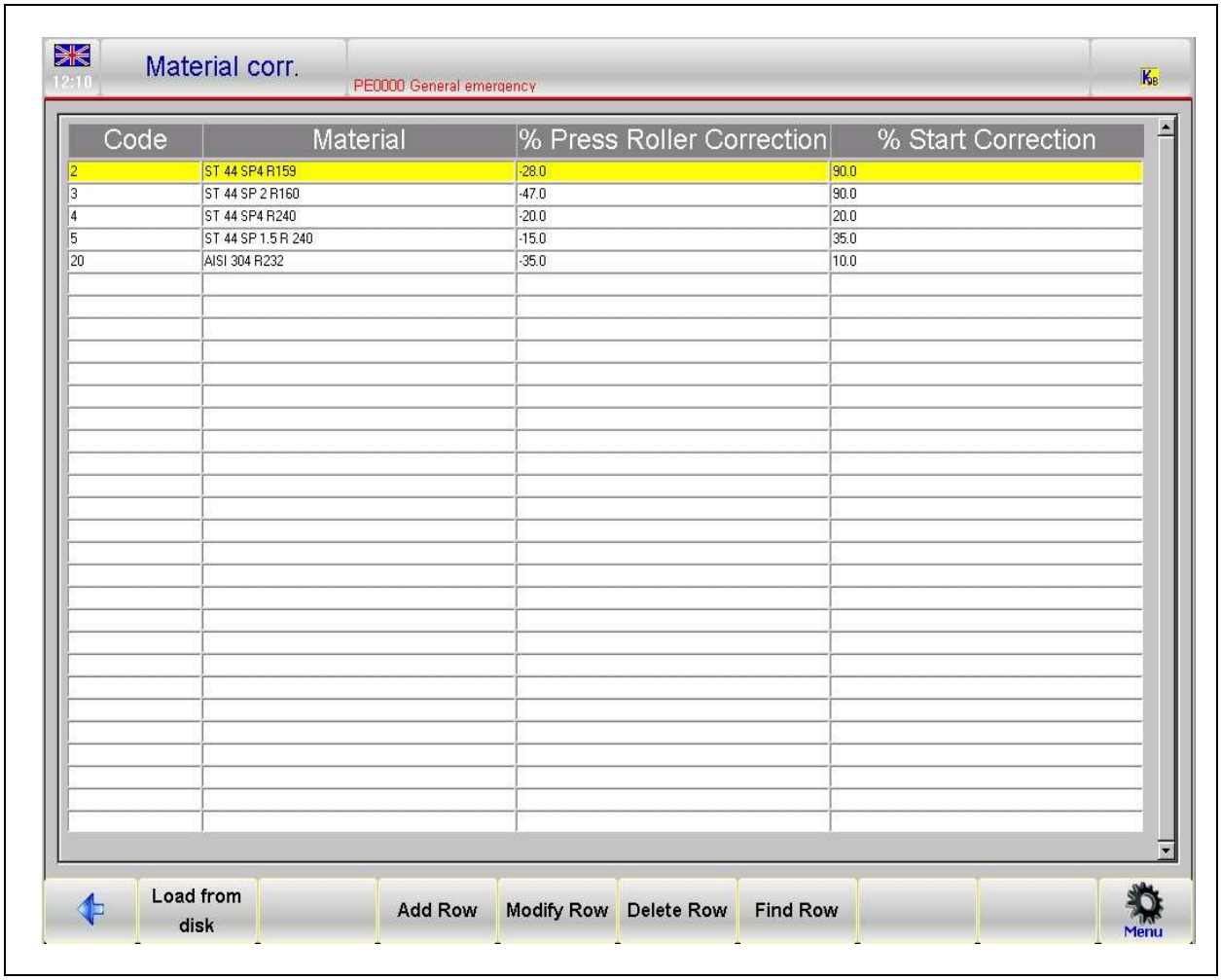


Figure 5.1 - Material correction table

The figure illustrates the table with several materials entered.
Each line in the table corresponds to a type of material. Each line is described by:

- **Code:** this is a pure number that univocally identifies the material;
- **Material :** gives a description of the material;
- **Calender Correction %:** gives the correction percentage to add to the geometric target calculated for the roller in all rolling steps of the program:

Cal Targ = Geo Targ + Geo Targ * (Calender Correction %) / 100

- **Entrance Correction %:** gives the correction percentage to add to the geometric target calculated for the entry roller in all the program's entrance steps:

Ent Targ = geo Targ + geo Targ * (Entrance Correction %) / 100

These corrections will not be applied during the set-up phase of a program if the material is not specified.
On the other hand, if the material is specified, the corresponding corrections will be applied to the various program steps.
Application of these corrections can always be disabled by entering the following **Generic Parameters**;

- ***Enab. Calender Corrections***: enter 0 and the *Calender Correction %* will not be considered;
- ***Enab. Entrance Corrections***: enter 0 and the *Entrance Correction %* will not be considered;

Comply with the following procedure to access the ***Generic Parameters*** mask:

- press the 

key to access the menu;
- select the ***Configure*** item.
- press 2 to access the ***Generic Parameters*** mask;

The operator must fill out this tale according to the tests conducted and experience acquired during the machining processes.

5.2 Operations with the table

A line in the table can be added, edited, eliminated and searched.

How to add a line to the table

This is done in order to create a new material with the corresponding corrections:

- Press the **[*Add Line*]** function key.
- enter the data of the new line in the window that appears.

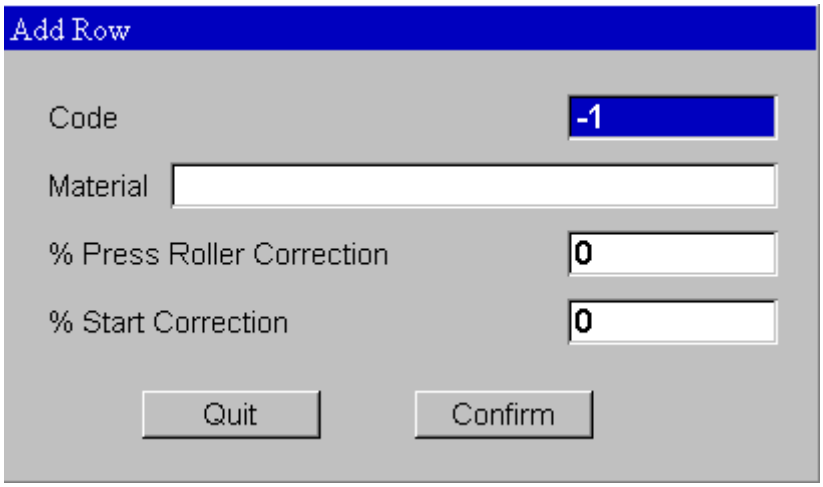


Figure 5.2 – Line addition window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to edit a line in the table

Allows the data of a material already in the table to be modified:

- go to the line you wish to modify with the arrows;
- Press the **[*Change Line*]** function key.
- the line data can be modified in the window that appears.

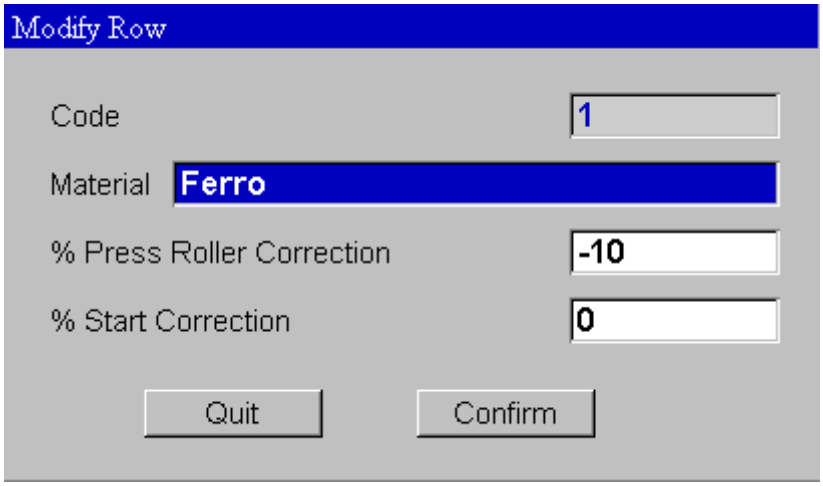


Figure 5.3 – Line editing window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to delete a line from the table

Allows a material to be deleted from the table:

- use the arrows to go to the line you wish to modify;
- Press the **[*Delete Line*]** function key.

How to find a line in the table

Allows you to search for a material in the table:

- Press the **[*Find Line*]** function key.
- Enter the code of the required material in the window that appears.

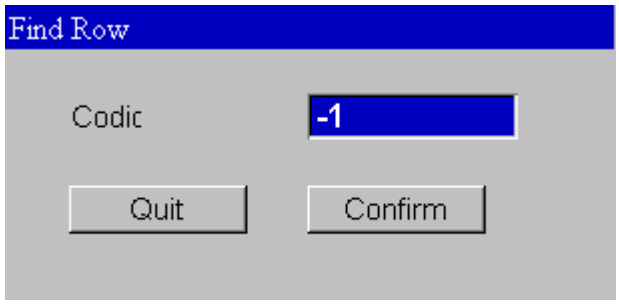
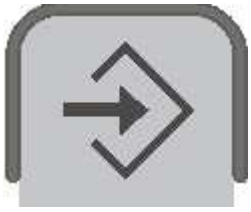


Figure 5.4 – Line search window

- After having entered the code, go to the **[Confirm]** button and press **[ENTER]**.

How to save the table

Saves the correction table in the hard disk. Comply with the following procedure:

- press the  key;
- the table will be saved in the hard disk.

How to save the table on backup unit

Saves the correction table on backup unit. Comply with the following procedure:

- press the 

key;
- the table will be saved on floppy disk.

How to load the table from backup unit

Loads the correction table from a floppy disk. Comply with the following procedure:

- Press the **[*Load from Disk*]** function key.
- the table will be loaded from the backup unit.

END OF CHAPTER

6 Interpolation table

6.1 General description

There is a passage between sections with different radii in certain figures, particularly the polycentric, oval and open ones. This causes marks on the plate that may be undesired in certain processes. Interpolation steps must therefore be added in order to join sections with different radii, steps in which the calender roller moves at the same time as the rotational movement so as to prevent the plate from being marked.
Comply with the following procedure to access the interpolation table:

- press the 

key twice to access the system menu;
- select the ***Configure*** item;
- press **4** to access the following page:

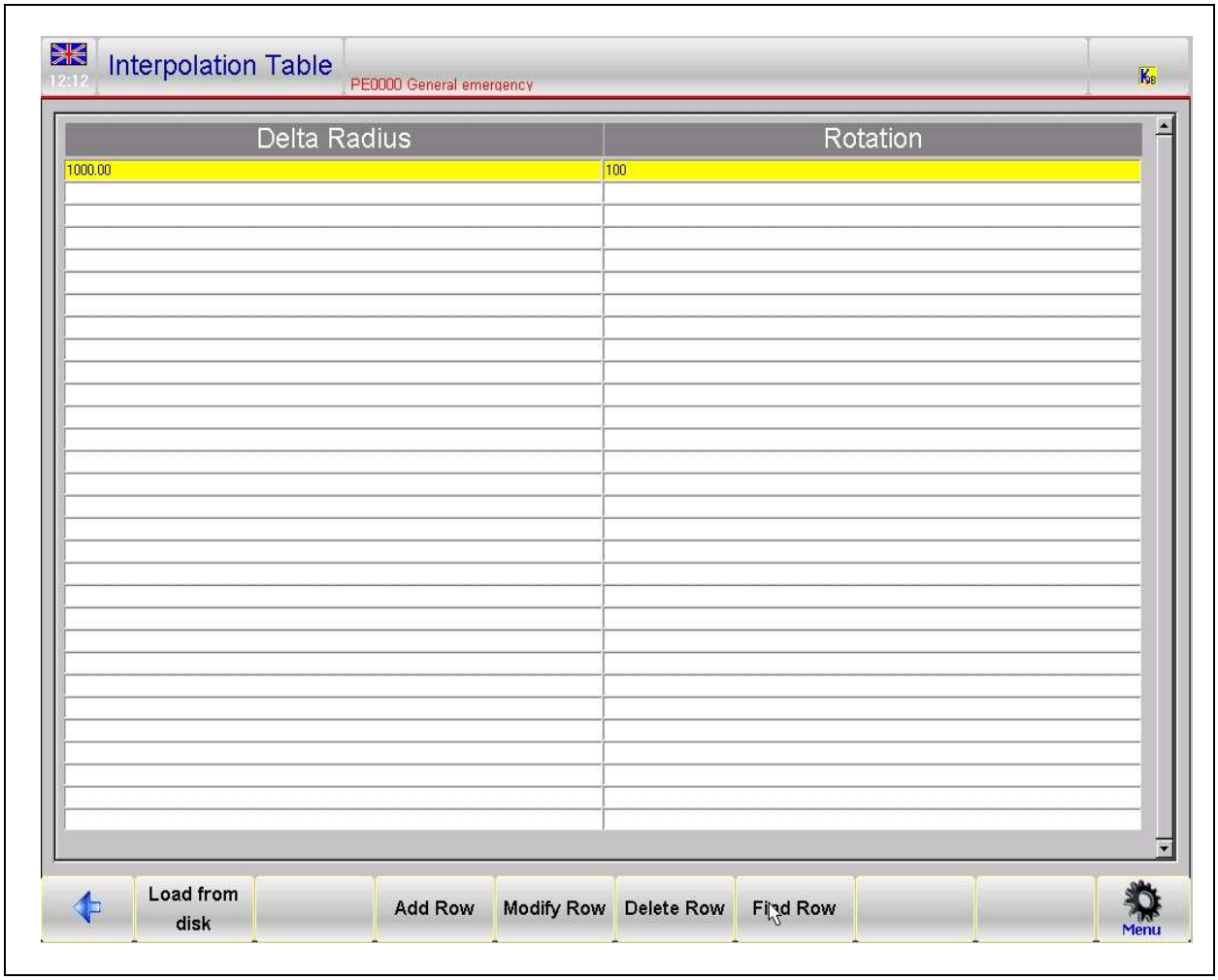


Figure 6.1 - Interpolation table mask

Each line of the table is described by:

- **Radius Delta:** represents the difference between two radius values;
- **Rotation:** represents the value of the joining section.

In practice, the values of the unions that depend on the difference between the radii that characterize the two sections that must be joined are entered in this table.
This table must be compiled by the operator.

6.2 Operations with the table

A line in the table can be added, edited, eliminated and searched.

How to add a line to the table

Allows a new element to be added to the table:

- Press the **[*Add Line*]** function key.
- enter the data of the new line in the window that appears.

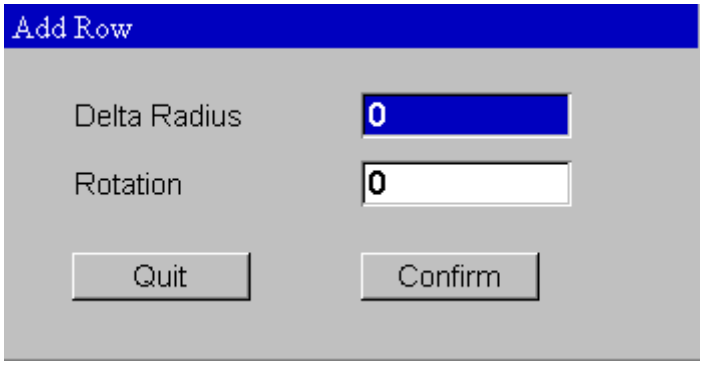


Figure 6.2 - Line addition window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to edit a line in the table

Allows you to modify an element already in the table:

- go to the line you wish to modify with the arrows;
- Press the **[*Change Line*]** function key.
- the line data can be modified in the window that appears.

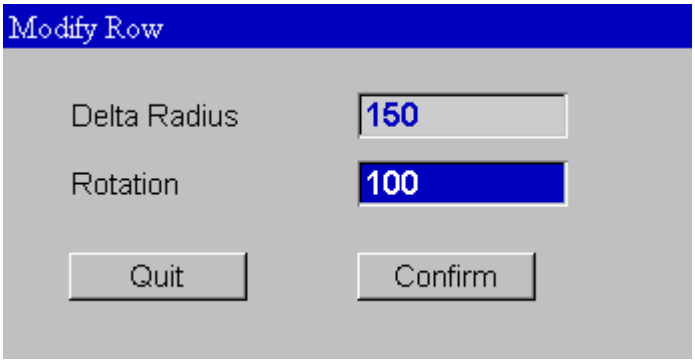


Figure 6.3 - Line editing window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to delete a line from the table

Allows an element to be deleted from the table:

- use the arrows to go to the line you wish to delete;
- Press the **[*Delete Line*]** function key.

How to find a line in the table

Allows you to search for an element in the table:

- Press the **[*Find Line*]** function key.
- The Radius Delta you wish to find can be entered in the window that appears.

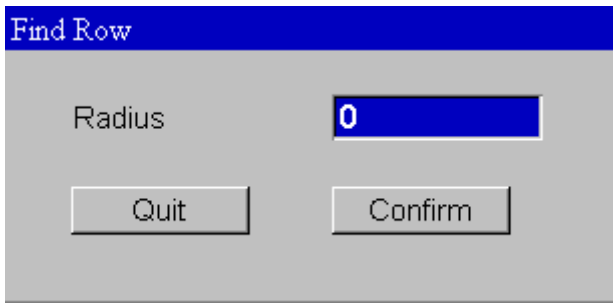
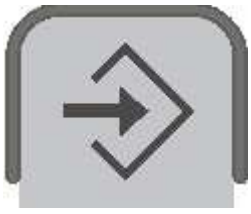


Figure 6.4 - Find line window

- After having entered the Radius Delta, go to the **[Confirm]** button and press **[ENTER]**.

How to save the table

Saves the interpolations table in the hard disk. Comply with the following procedure:

- press the  key;
- the table will be saved in the hard disk.

How to save the table on backup unit

Saves the interpolations table on backup unit. Comply with the following procedure:

- press the 

key;
- the table will be saved on backup unit.

How to load the table from backup unit

Loads the interpolations table from a backup unit. Comply with the following procedure:

- Press the **[*Load from Disk*]** function key.
- the table will be loaded from the backup unit.

6.3 Use of the table

This table is used for generating interpolation steps when a polycentric, oval or open figure is created as described further on.
Supposing that a polycentric program is being created. The **L R1-R2** and **L R2-R3** values in the setting mask represent the values of the unions between the sections with different radii, as also shown in the figure being made.
These values remain at 0 when the program data are being set.
If the **[*Interp. Values*]** function key is pressed, they are calculated by means of the interpolation table and using the data in the settings mask. Proceed by interpolating the values in the table if necessary.
If the values of the unions are different from 0, the L values of the sections joined are also modified in the settings mask: half of the value of the union is subtracted from both the sections involved.
The **L R1-R2** and **L R2-R3** values can also be modified directly if the calculated values are incorrect.
Now, when program steps are generated by pressing the **[*Calculate*]** function key, interpolation steps are entered in the passage between rolling operations with the radii concerned if the values of the unions are different from 0.
The calender roller moves at the same time as the rotation roller in these steps. The rotation value will be the same as the union value, while the calender roller moves from the target corresponding to the initial radius to the target corresponding to the final radius.

END OF CHAPTER

7 Table of support and turret targets

7.1 General description

This table is only used if the side supports and vertical turret are installed on the machine.
When program steps are generated, the targets of these axes are very complicated to determine, particularly when figures other than the round are created.
For this reason, the targets of these axes are set to their minimum value in all the steps when these figures are generated. The operator must learn the correct targets from the first autolearning mask by following the procedure described in chapter 1. However, this table gives the values of the targets are is therefore used for the round figure
Comply with the following procedure to access the table of support/turret targets:

- press the 

key twice to access the system menu;
- select the ***Configure*** item;
- press **5** to access the following page:

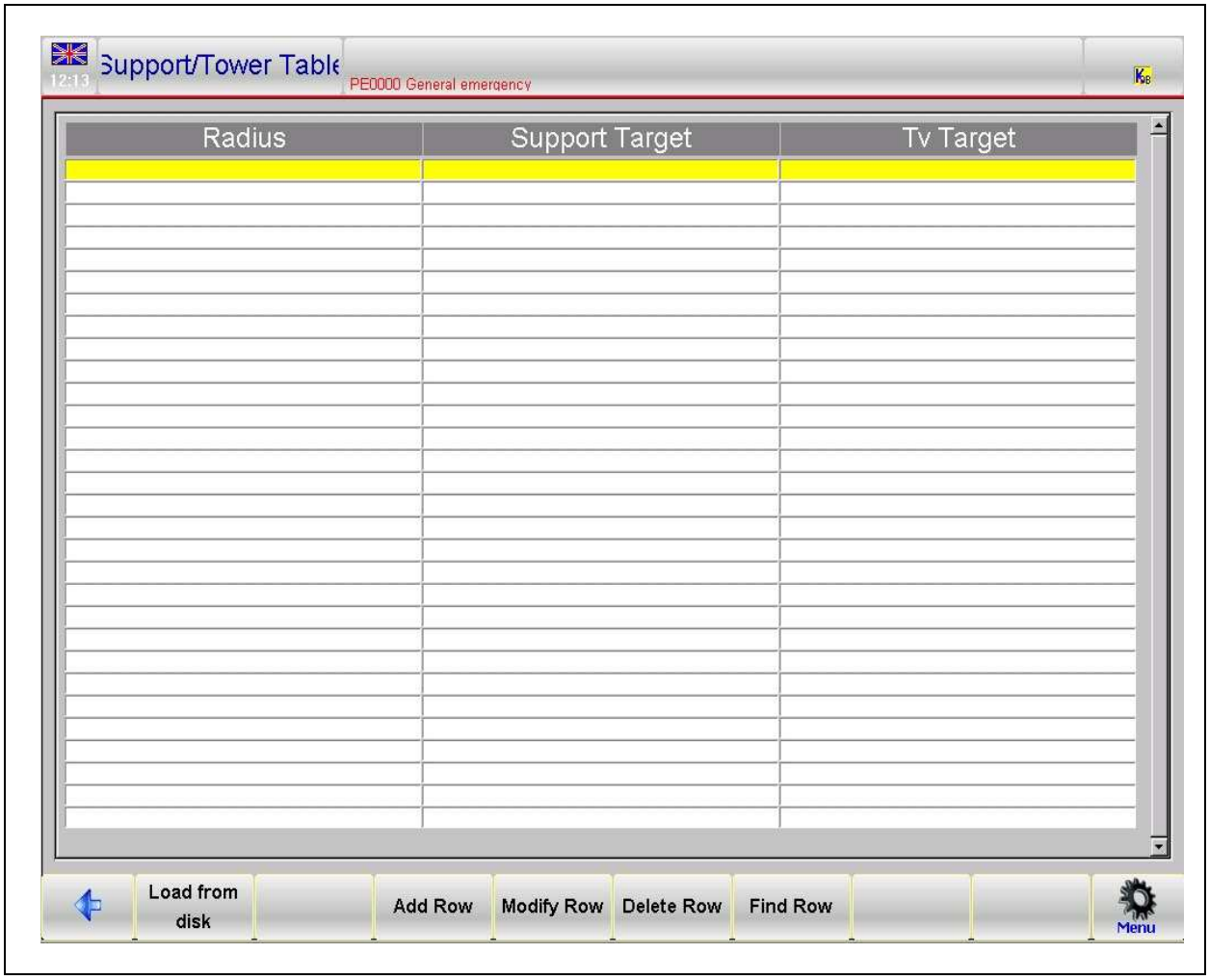


Figure 7.1 - Mask of the support/turret target table

Each line of the table is described by:

- **Radius:** represents the rolling radius;
- **Support Target:** positioning target of the support from the side of the calender roller. The support from the side of the entry roller is set to the minimum target;
- **Tv Target:** turret positioning target.
- The targets at which the support and the vertical turret must position are entered in this table, depending on the radius of the step being rolled.

This table must be compiled by the operator.

7.2 Operations with the table

A line in the table can be added, edited, eliminated and searched.

How to add a line to the table

Allows a new element to be added to the table:

- Press the **[*Add Line*]** function key.
- enter the data of the new line in the window that appears.

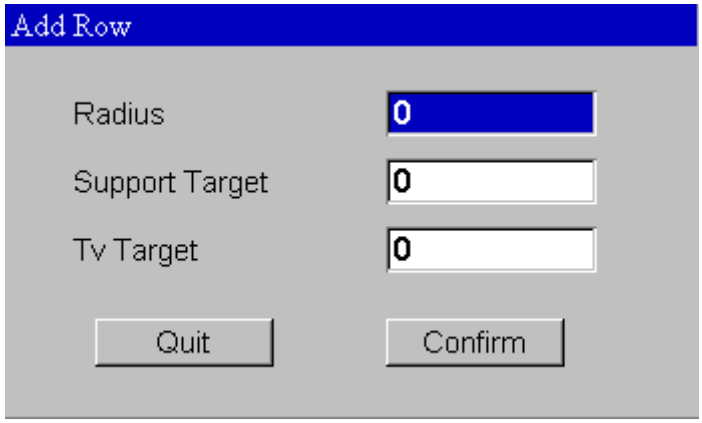


Figure 7.2 - Line addition window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to edit a line in the table

Allows you to modify an element already in the table:

- go to the line you wish to modify with the arrows;
- press the **[*Change Line*]** function key.
- the line data can be modified in the window that appears.

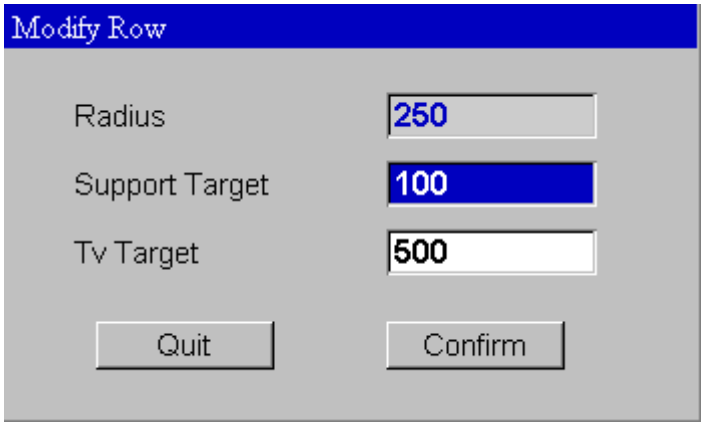


Figure 7.3 - Line editing window

- After having entered the data, go to the **[Confirm]** button and press **[ENTER]**.

How to delete a line from the table

Allows an element to be deleted from the table:

- use the arrows to go to the line you wish to delete;
- press the **[*Delete Line*]** function key.

How to find a line in the table

Allows you to search for an element in the table:

- press the **[*Find Line*]** function key.
- the Radius of the element you wish to find can be defined in the window that appears.

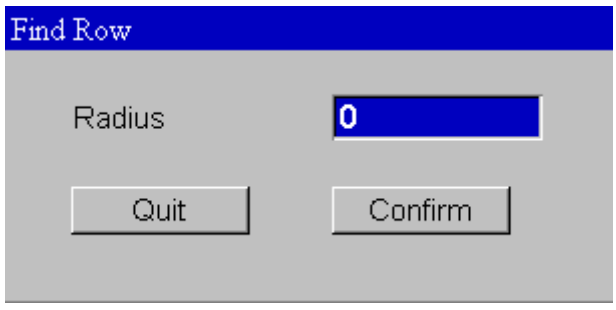
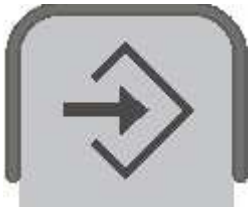


Figure 7.4 - Find line window

- After having entered the Radius, go to the **[Confirm]** button and press **[ENTER]**.

How to save the table

Saves the table in the hard disk. Comply with the following procedure:

- press the  key;
- the table will be saved in the hard disk.

How to save the table on backup unit

Saves the table on backup unit. Comply with the following procedure:

- press the 

key;
- the table will be saved on backup unit.

How to load the table from a backup unit

Loads the from a backup unit. Comply with the following procedure:

- press the **[*Load from Disk*]** function key.
- the table will be loaded from the backup unit.

7.3 Use of the table

This table is used for determining the targets of the support and turret when generating round figure steps.
A linear interpolation is also available if the radius of the step is not exactly included in the table.

The table can be compiled by the operator by adding the various different elements as explained in the previous section, but can also be compiled by learning the values directly from the learning page in the following way.

Learning a support and turret target in the table

Allows the target of a support or turret axis to be learnt by support/turret targets table.

- position the axis at the required target;
- press the 

key to access the menu;
- select the ***Learn S Table*** or ***Learn Tv Table*** item: the value will be entered in the table by adding an element if the one corresponding to the radius of the current step does not exist.

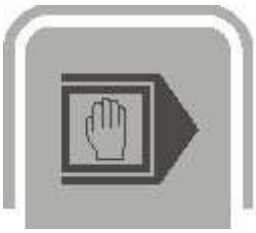
END OF CHAPTER

8 Correction Database

8.1 General description

Thanks to use of this database, corrections identified during the processes can be acquired in order to form a database from which the previously memorized corrections can be taken during the processing phases in the automatic mode.
Linear interpolation functions for values saved in the database have been included to ensure that everything functions in the best and most uniform way for all types of steps.
This allows a theoretic correction value to be obtained even for steps in which a correction value has not been saved, since it can be calculated using the previously acquired data.
These calculated values can be corrected and then entered again in the database so as to continue adding to the information acquired by the machine.

KVARADB ENABLING

Access the ***SETTINGS*** page by pressing the  key in order to enable the *Kvara Database* functions.

Press the ***[Enable KvaraDB]*** function key or the
[Disable KvaraDB] function key to enable/disable the database.

The following image appears in the icon area of the application at the top right when the database is enabled:

Figure 8.1 - KvaraDB enabled icon

The Kvara Database is accessed by means of the following procedure:

- press the 

twice to access the system menu;
- select the ***Configure*** item;
- press **3** to access the next page:

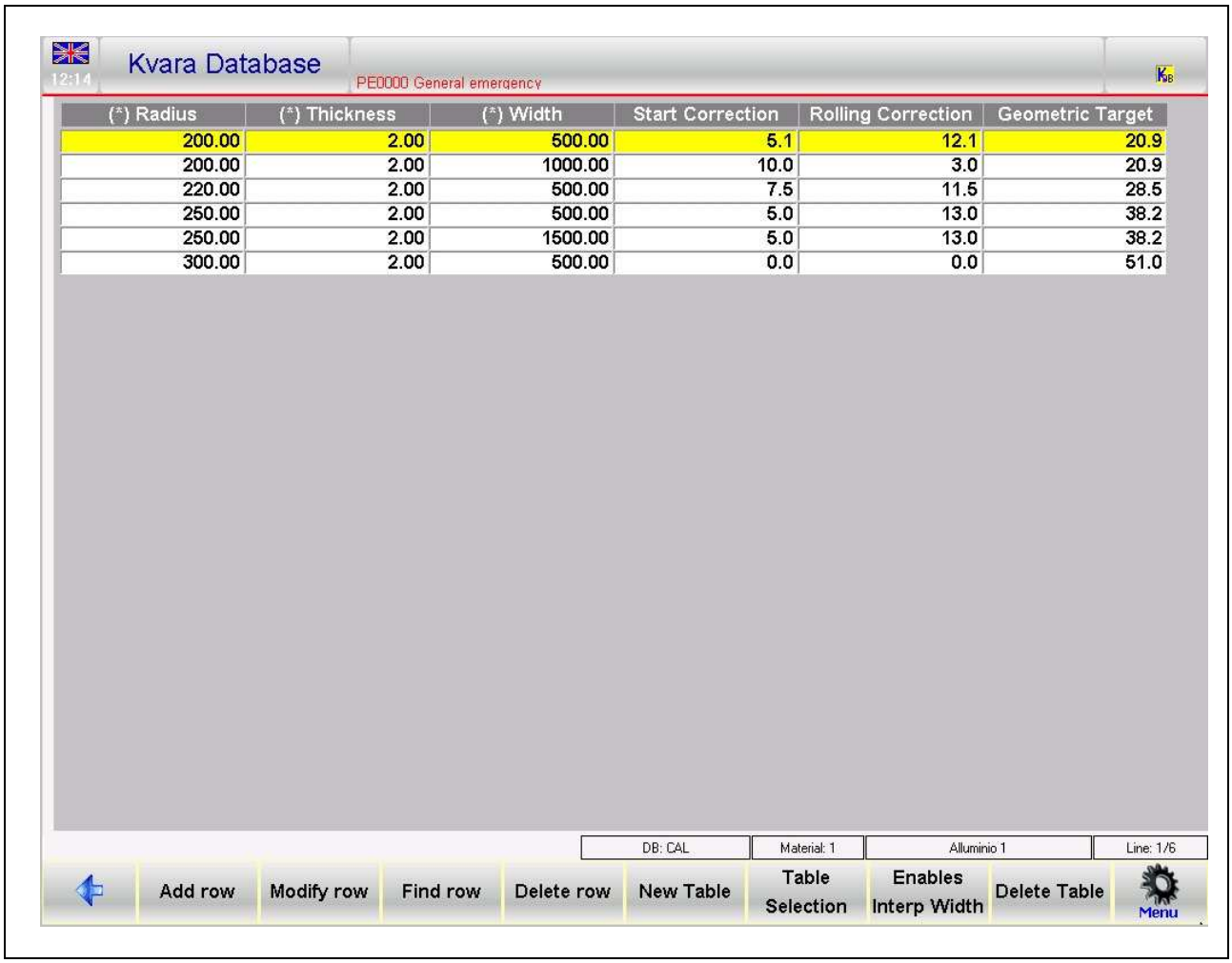


Figure 8.2 – Kvara Database page

The database is called CAL and consists of a group of tables, where each corresponds to a material.
Each table is identified by the number of the corresponding material (from 1 to 99). A descriptive text can also be associated with the table if required.
All the corrections acquired over time for that material are memorized in each of the tables.

THE "Kvara Database" PAGE

This page is in the form of a table and displays the currently activated material table. The material is normally the one set in the current program.

In the example in the figure, the table shows the corrections for material number *"1"* called *"Aluminium 1"*, belonging to the *"CAL"* database.

The first table in the database will be displayed on access to the page is there is no table for the material set in the program or if no material has been set in the program.

Each column corresponds to a field of the database.
The fields are divided as to key fields and value.

The key fields are those according to which the individual records of each table are identified in a univocal way and with which sequencing and searches are carried out.

The correction fields are simply the values associated with the respective keys and are saved at the same time.

Each line, or record, corresponds to a correction that has been entered.

The database contains 6 fixed fields, since the structure of the database itself cannot be modified.

- 3 fields, which are Radius, Thickness and Width
- 2 correction fields: Entrance Corr. and Calender Corr.
- the sixth field, Geometric Target, represents the geometric calculation corresponding to the radius of the record

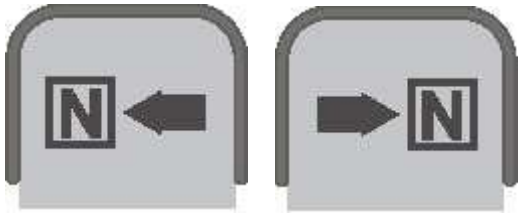
For a total of 5 columns. The first three can be recognized as key fields since they are indicated by the ***(*)*** symbol.

8.2 Operations with the table

All the operations that can be carried out with the table are described below.

Table selection and deletion

Press the cursor keys  to select the required record.

Press the  keys to select the next or previous table in the Database.

To eliminate the current table, press the ***[Eliminate Table]*** key and answer *"Yes"* to the "confirm" message.

Add a line to the table Allows a new line to be added to the table:

- press the ***[Add Line]*** function key;
- you will access a window in which the data of the new line must be entered.

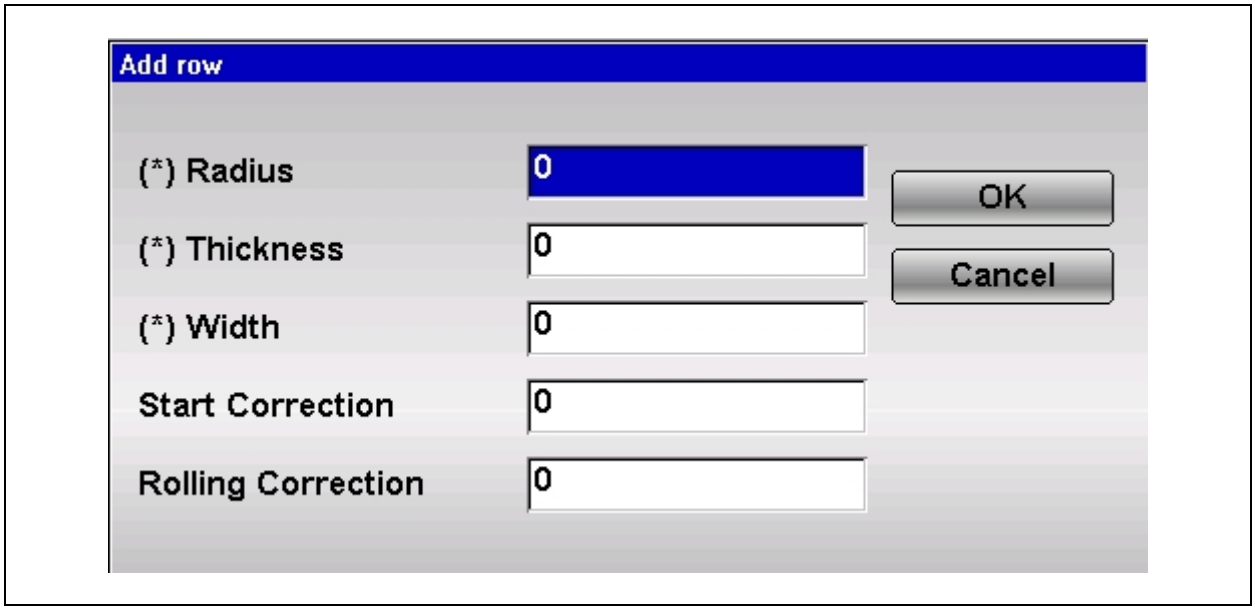


Figure 8.3 – Add Line window

- After having entered the data, go to the **[OK]** button and press **[ENTER]**.

Edit a line in the table Allows the line currently selected in the current table to be edited:

- use the arrows to go to the line that must be edited;
- press the ***[Edit Line]*** function key;
- you will access a window in which the correction data of the line can be edited.

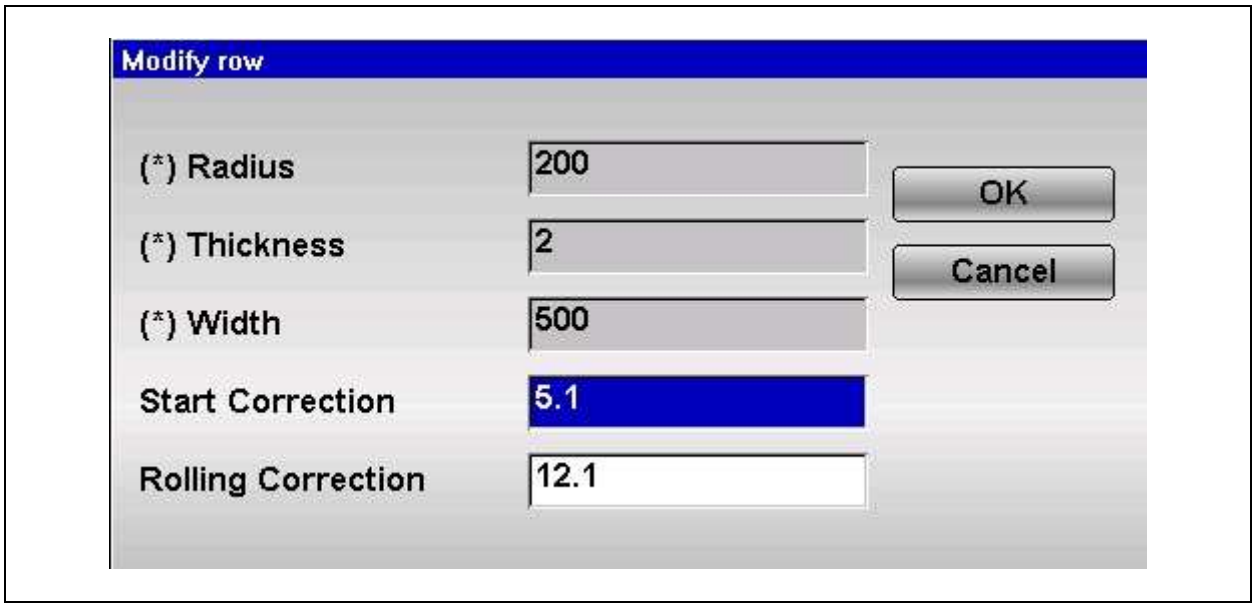


Figure 8.4 - Edit Line window

- After the data have been entered, go to the **[OK]** button and press **[ENTER]**.

Find a line in the table Allows you to search for a line in the table:

- press the ***[Find Line]*** function key;
- you will access a window in which you must enter the key values you wish to find.

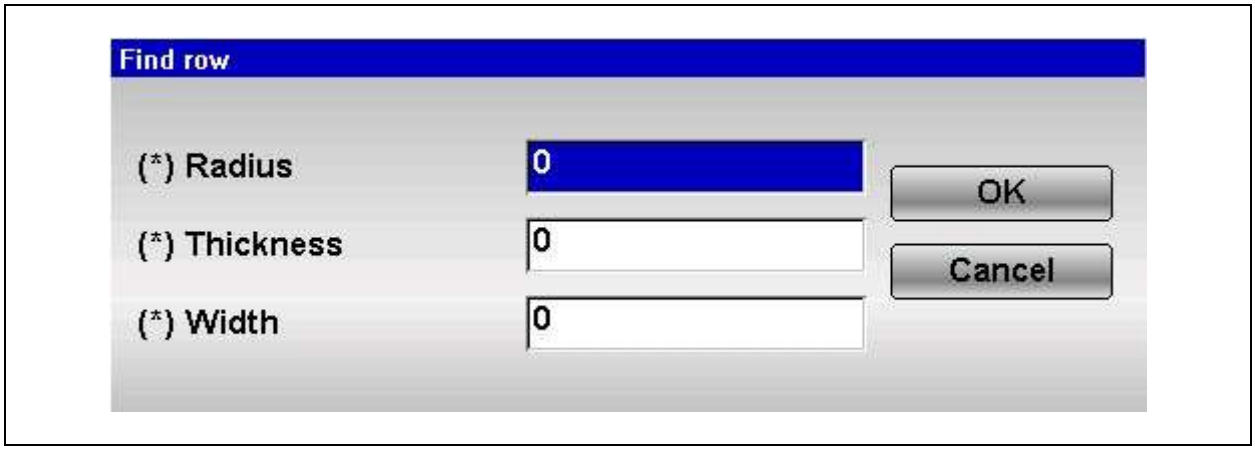


Figure 8.5- Find Line window

- Enter the required data then go to the **[OK]** button and press **[ENTER]**.

Delete a line from the table

Allows you to delete the currently selected line from the current table:

- use the arrows to go to the line you want to delete;
- press the ***[Delete Line]*** function key;

How to create a new table

Adds a new table to the database:

- press the ***[New Table]*** function key;
- the next window allows you to define the code of the material and a description;

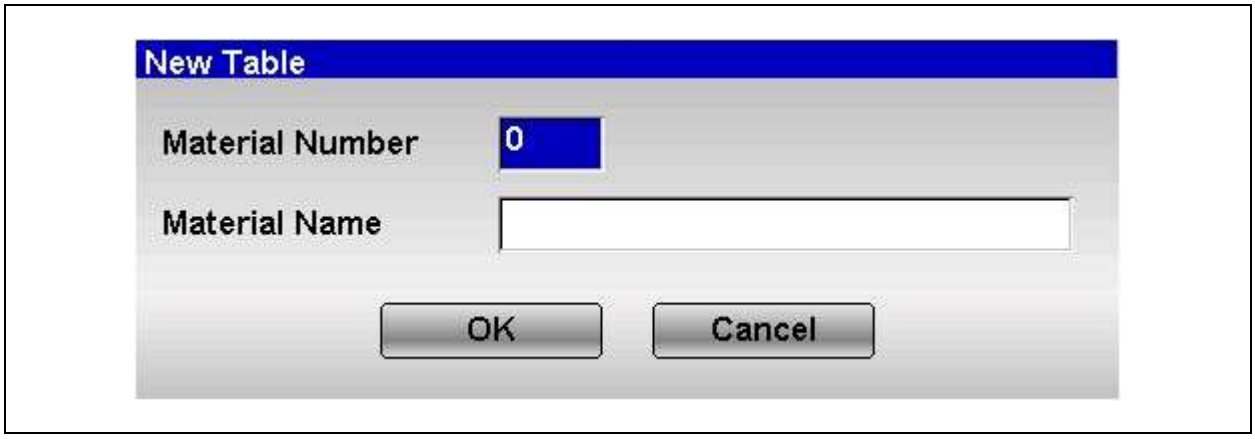


Figure 8.6 - New Table window

Select Table

Allows you to select the current table from a list:

- press the ***[Select Table]*** function key;
- you will access a window in which you can select the table from a list;

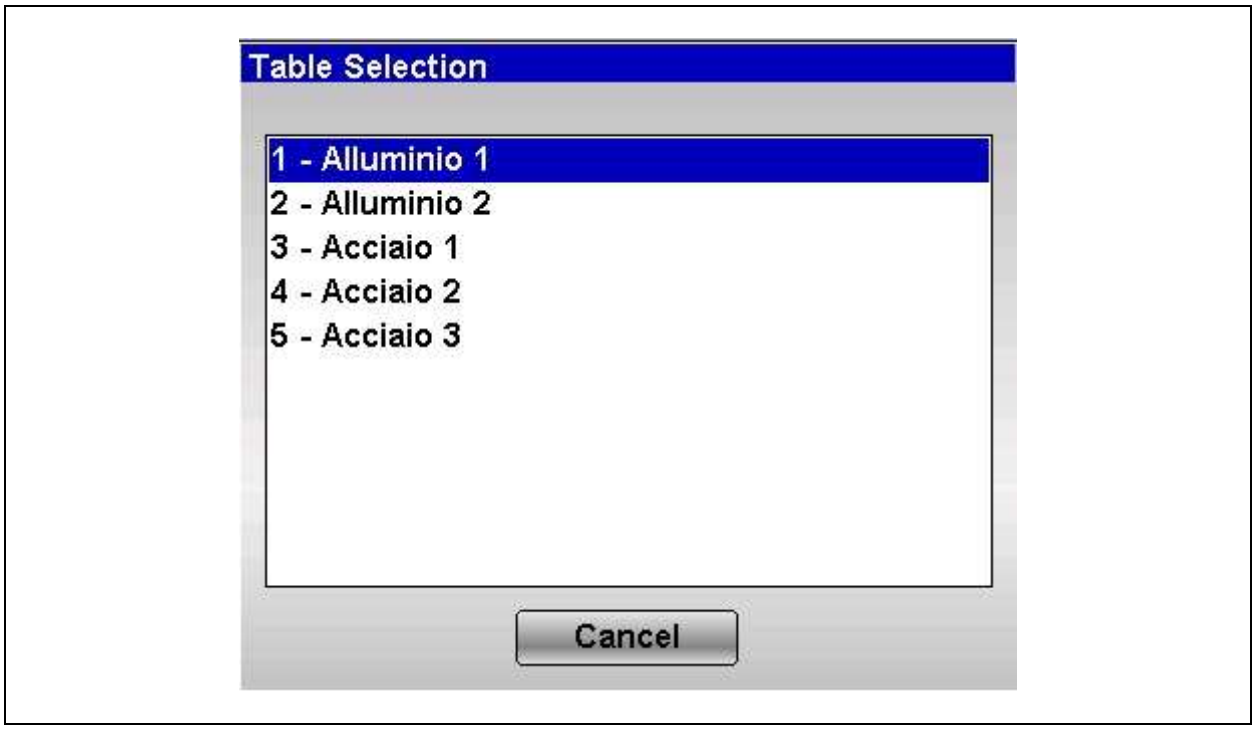


Figure 8.7 - Select Table window

- select the required table with the cursor keys ▼ ▲ and confirm with the ↵ key.

Enable width interpolation

Press the ***[Enable Width Interp]*** or ***[Disable Width Interp]*** function key to enable/disable the width interpolation function. If this function is enabled, the WC DB icon will appear in the icon area of the application at the top right.

Change table name

Allows you to change the description of the material associated with the table:

- press the  key;

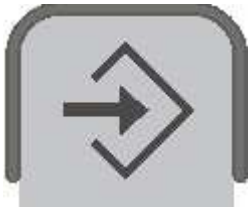
- press the ***[Change Tab Name]*** key;
- the name of the table can be changed in the next window;

Figure 8.8 – Change Table Name window

- Enter the data then go to the **[OK]** button and press **[ENTER]**.

How to save the table

Saves the selected table in the hard disk. Comply with the following procedure:

- press the  key;
- the table will be saved in the hard disk.

How to save the table in the backup unit

Saves the selected table in the backup unit. Comply with the following procedure:

- press the 

key;
- the table will be saved in the backup unit.

Save table as

Saves the current table with a new numerical code and material description:

- press the  key;
- press the ***[Save Tab As...]*** key;
- the code and name of the material can be entered in the next window;

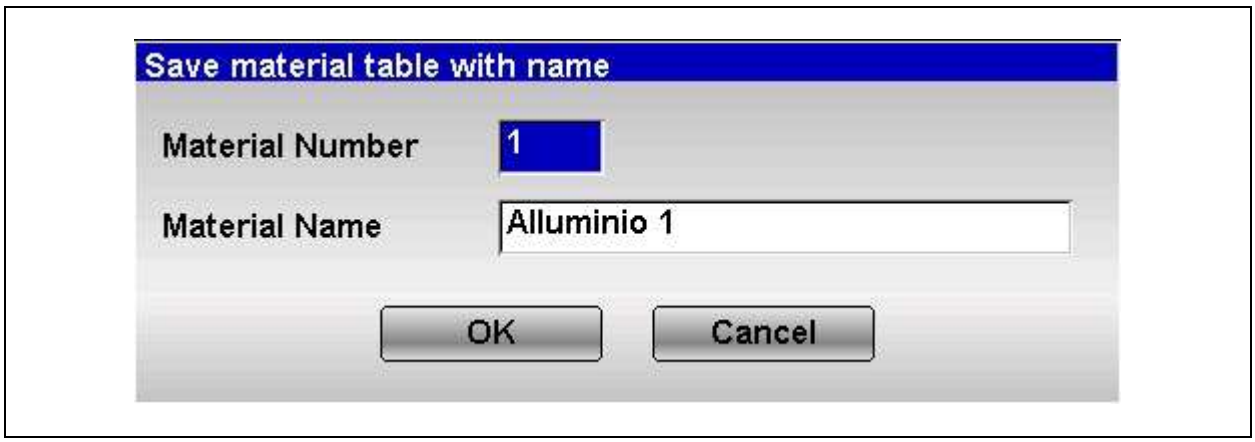


Figure 8.9 – Save Table As window

- Enter the data then go to the **[OK]** button and press **[ENTER]**.

8.3 Operations with the database

The next functions are accessed by means of the system menu, which is accessed by pressing the 

key.

Save DB This function is used to save the current database in the backup unit.

Load DB This function loads the database from the backup unit.

8.4 Acquisition of correction values in the database

Once *KvaraDatabase* has been enabled, the corrections can be acquired from the *3D Self-learning 3D* pages.

After having entered the right correction in the *3D Self-learning* page, press the ***[Learn DB with Step]*** function key to learn either the entrance correction or the calendering correction of the step**.**
The correction in the page is recorded in the material table corresponding to the currently set one.
If this table has not been created yet, enter the description of the new material in the window that automatically appears and then confirm in order to create the table.
If you attempt to enter a value that already exists in the database, you will be asked for confirmation as to whether the value must be overwritten or not:

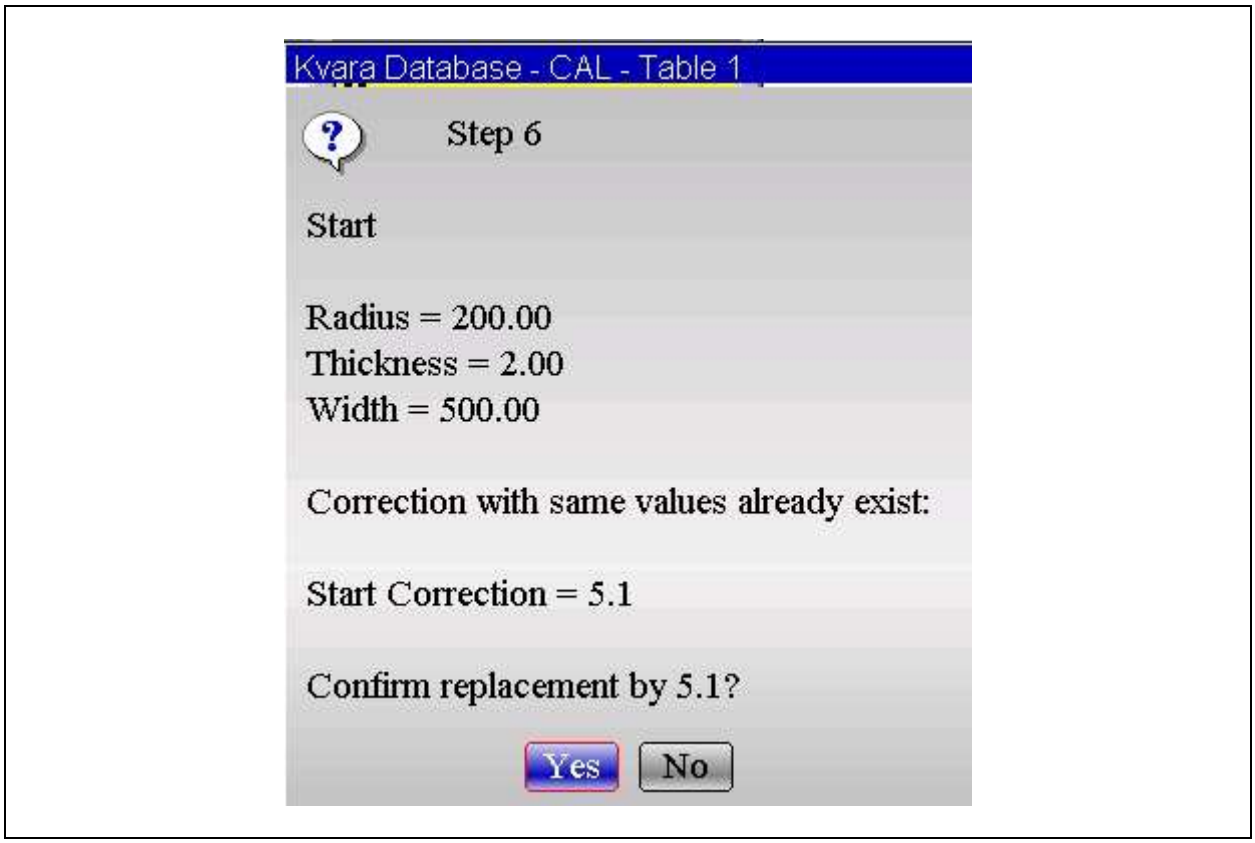


Figure 8.10 – Correction entry window

If the special parameter ***En. DB Learning with entire prog***. is 1 and the figure being created is a circle, then the corrections made in all the entrance and calendering steps of the program can be added to the database:

- press the  key;
- press the ***[Learn DB with Prog]***

8.5 Use of the database correction values

Each key field has properties that determine the way the Database functions.

- ***Interpolation***: indicates whether interpolations must be carried out in the field during the search phase if the exact data item is not identified in the database itself. This property is fixed for the radius and can be selected for the width. The thickness cannot be interpolated.
- ***Tolerance:*** width tolerance is activated if width interpolation is disabled.

Once the *KvaraDatabase* is enabled, the correction data are automatically searched and entered in the programs.
If the special parameter ***Enab. DB Request Result Dialog*** is 1, a window appears with the corrections whenever a correction is found and entered in the program:

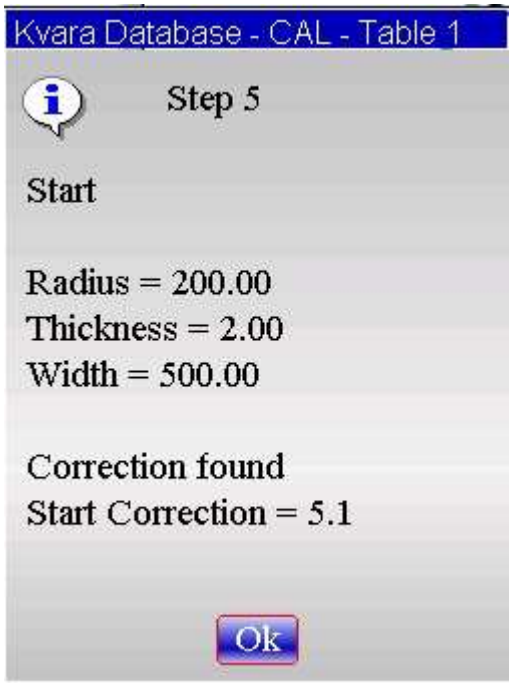


Figure 8.11 – Correction Found window

Another way to enter a correction in a program step is to use the following procedure from the 3D Self-learning page:

- press the  key;
- press the ***[Correct DB Step]*** function key.

The 

image appears in the 3D Self-Learning and Automatic pages if a program step has been corrected using the database.

If width tolerance has been enabled and the width set in the program is not found, the process searches for the one with the nearest value.

Interpolation is the linear type: the process searches for records with key values that are immediately higher (*HIG*) and lower (*LOW*) that the required value.

If *LOW* and *HIG* are found, the result is an average calculated by means of the corresponding correction values. No correction is calculated if the values are not found.

END OF CHAPTER

9 Round figure sequences

9.1 General description

The numeric control allows various different step sequences to be generated for the round figure, which is the one more frequently used by the operators. These sequences are described in this chapter.

9.2 Normal round figure

The following steps are carried out after the first alignment steps for the normal round figure sequence:

Figure 9.1 - Entry steps

Entry is accomplished by positioning the entry roller and turning forwards.

Figure 9.2 - Positioning steps for rolling

Rollers X and Y are positioned so as to carry out the rolling process.
If installed, support Sr is brought to the target found in the support/turret targets table, as described in chapter 8.

Figure 9.3 - Rolling steps

The entire circle rolling process is carried out.

Figure 9.4 - Final positioning steps

Reverse rotation for half the length is takes place so as to make the plate easier to extract.

9.3 Round figure with double entry

To form a round figure with double entry, the numeric control can use two different sequences selected by means of the special **Double Entry Type** parameter, as explained in chapter 4

9.3.1 Double entry type 1

Sequence enabled if the value of the **Double Entry Type** parameter is 0.
The following steps are carried out after the first alignment steps:

Figure 9.5 - First entry steps

The first entry is accomplished by positioning the entry roller and turning forwards.

Figure 9.6 - Positioning steps for rolling

Rollers X and Y are positioned so as to carry out the rolling process.
If installed, support Sr is brought to the target found in the support/turret targets table, as described in chapter 8.

Figure 9.7 - Rolling step

Rolling takes place by leaving out the plate section that corresponds to entry.

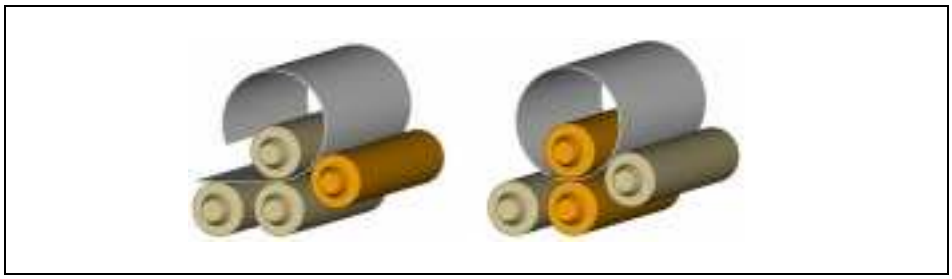


Figure 9.8 - Second entry steps

The second entry is accomplished by positioning the calender roller and turning forwards.

9.3.2 Double entry type 2

Sequence enabled if the value of the **Double Entry Type** parameter is 1.
In this sequence, the targets of the side supports, if installed, are set to the minimum value.
The following steps are carried out after the first alignment steps:

Figure 9.9 - First entry steps

The first entry is accomplished by positioning the entry roller and turning forwards.

Figure 9.10 - Positioning steps for rolling

Rollers X and Y are positioned so as to carry out the first rolling process.

Figure 9.11 - First rolling step

Rolling takes place to halfway along the length.

Figure 9.12 - Positioning steps for second entry

The calender roller lowers and turns, so as to set the plate in position for the second entry.

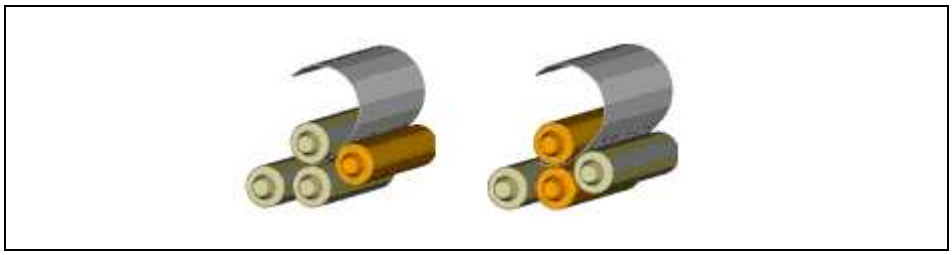


Figure 9.13 - Second entry steps

The second entry is accomplished by positioning the calender roller and turning backwards.

Figure 9.14 - Positioning steps for second rolling

Rollers X and Y are positioned so as to carry out the second rolling process.

Figure 9.15 - Second rolling step

Rolling takes place along second half of the length.

9.4 Normal round figure with turret

This sequence deals with positioning the vertical turret.
The following steps are carried out after the first alignment steps:

Figure 9.16 - Entry steps

The first entry is accomplished by positioning the entry roller and turning forwards.

Figure 9.17 - Positioning steps for rolling

Rollers X and Y are positioned so as to carry out the rolling process.
If installed, support Sr is brought to the target found in the support/turret targets table, as described in chapter 8.

Figure 9.18- First rolling section

Rotation takes place for rolling through to halfway along the length by the amount established by special parameter **Delta Z After Half Length**.
During this step, the vertical turret Tv is positioned at value
Tv = Tv fin - (**Delta Tv Turret Fin Pos**), as described in chapter 8

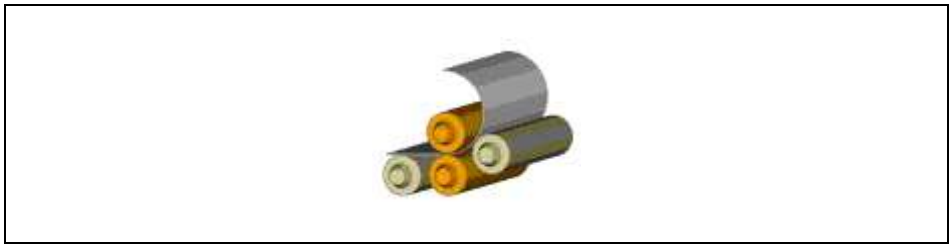


Figure 9.19 - First rolling section

Rolling terminates. During the passage from the previous step to this step, the rotational movement will not stop and the turret will set to the final Tv fin value.

Figure 9.20 - Final positioning steps

Reverse rotation for half the length is takes place so as to make the plate easier to extract.

9.5 Round figure with double entry and turret

The vertical turret is only handled when the type 1 double entry sequence is generated. The table of support/turret targets is not applicable to the double entry type 2. This means that the turret targets must be entered by the operator, as described in chapter 8.

The following steps are carried out after the first alignment steps:

Figure 9.21 - Entry steps

The first entry is accomplished by positioning the entry roller and turning forwards.

Figure 9.22 - Positioning steps for rolling

Rollers X and Y are positioned so as to carry out the rolling process.
If installed, support Sr is brought to the target found in the support/turret targets table, as described in chapter 8.

Figure 9.23- First rolling section

Rotation takes place for rolling through to halfway along the length by the amount established by special parameter **Delta Z After Half Length**.
During this step, the vertical turret Tv is positioned at value
Tv = Tv fin - (**Delta Tv Turret Fin Pos**), as described in chapter 8

Figure 9.24 - Second rolling section

Rolling terminates, leaving out the plate section that corresponds to entry. During the passage from the previous step to this step, the rotational movement will not stop and the turret will set to the final Tv fin value.

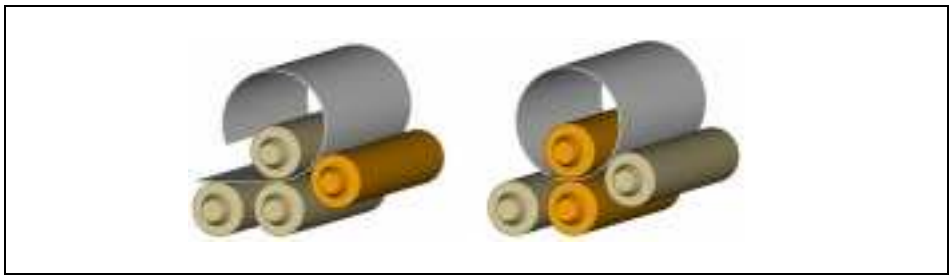


Figure 9.25 - Second entry steps

The second entry is accomplished by positioning the calender roller and turning forwards.

End of Chapter