

# NUMERICAL CONTROL NC400 PLUS

5804A0024 - English

ROVER  
SOFTWARE PROGRAMMING MANUAL  
(release 3.xx)

Series nr. ....



BIESSE S.p.A. Woodworking Machinery



# INTRODUCTION

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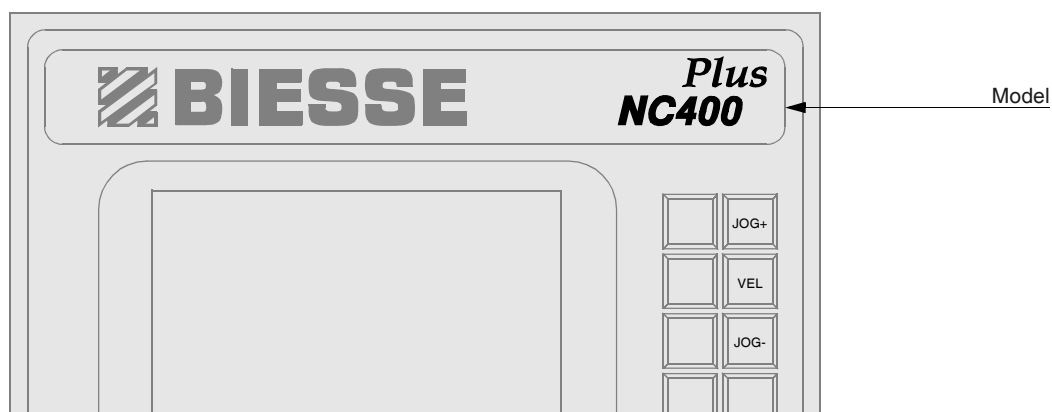


# Chapter 1

## GENERAL INFORMATION

### 1.1 IDENTIFICATION OF THE NUMERICAL CONTROL

The numerical control is identified by the model name shown on the control module.



### 1.2 TECHNICAL INFORMATION

- 12 Vdc power supply.
- Numerical and functional keyboard, IP-54, mechanical.
- 6" LCD graphic display (320 x 240 mm).
- RS-232 serial line for the connection to a PC (debug).
- 1 MB of memory available for storing programs.
- 2 MB Floppy-disk (1.44 MB formatted).
- Multitask operating system.

### 1.3 SOFTWARE INFORMATION

The information relative to the software loaded can be displayed on screen. Proceed as described in "Displaying software information" (page 2-8).

## 1.4 SCOPE AND LIMITS OF THE MANUAL

This manual has been prepared by the manufacturer, and forms an integral part of the equipment of the Numerical Control which is installed on the machine. The manual defines the scope for which the Numerical Control has been designed and manufactured.

The information contained in this manual is designed to be employed by the operator using the Numerical Control. It integrates the information contained in the User Manual of the machine. This manual may also include annexes containing information on the configuration of the specific machine it refers to.

In order to prevent incorrect operations which may entail dangers to people, it is important that this manual be read thoroughly, especially when first using the machine, to become familiar with the main controls and functions of the machine.

The machine on which the Numerical Control has been installed is a complex machine, and the information contained in this manual may not, by itself, offer any guarantee against possible risks. Your safety is also in your own hands.

For easier reference, this manual has been divided in chapters and subchapters, so as to separate each subject in a logical operational order. A table of contents can be found at the beginning of the manual to help you find the required subjects easily.

Please keep this manual in a suitably handy place for immediate reference.

Some important parts of text are printed in bold face and marked with icons, as described below:



### **DANGER**

**Special caution must be paid to prevent dangers and serious injuries to the operator.**



### **CAUTION**

**Special caution must be paid to prevent dangers and damages to things or the operator.**



### **INFORMATION**

**Important information which requires specific attention.**

## 1.5 DOCUMENTATION AVAILABLE

The documentation supplied with the machine includes the documents listed in the relevant User Manual of the machine.

## 1.6 ABBREVIATIONS AND TERMS

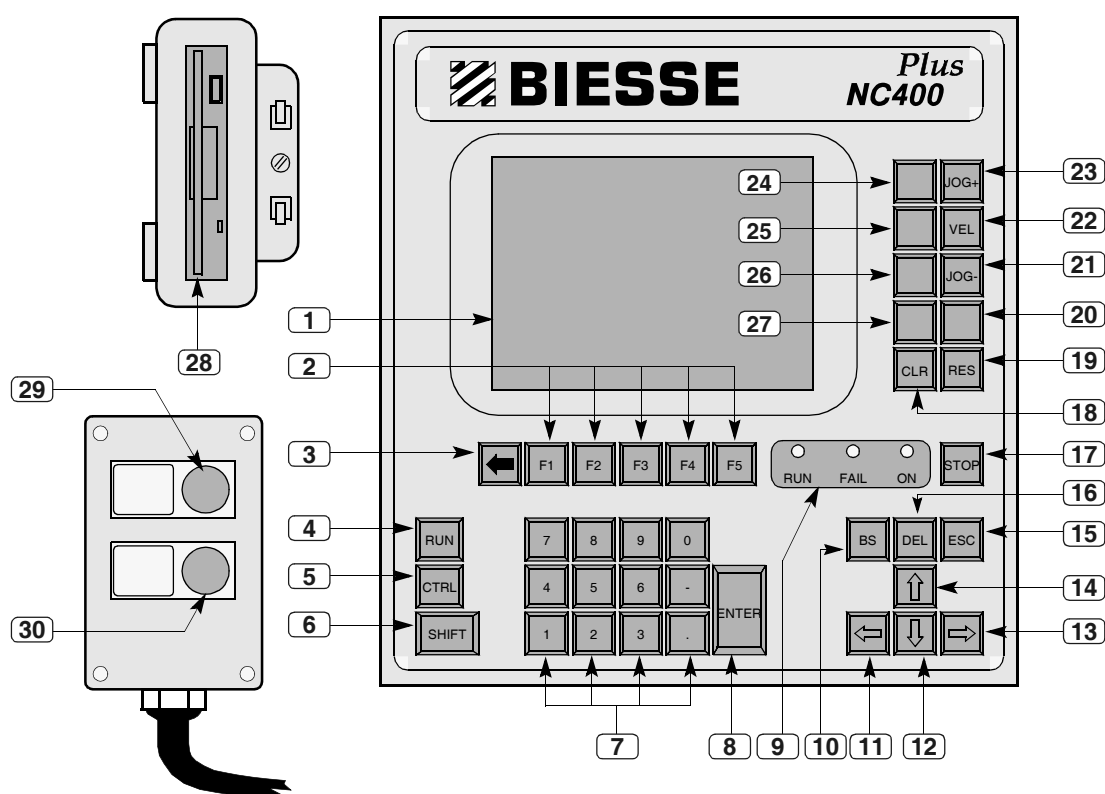
Please refer to the User Manual of the machine.

# Chapter 2

## REFERENCE INFORMATION

### 2.1 DESCRIPTION OF CONTROLS

The keyboard and the control accessories (drive, override) allow the operator to communicate with the machine, enter data or programs, and check machine functions on screen.



- 1** High resolution 6" text and graphic colour screen.
- 2** F1, F2, F3, F4, F5 keys, used to recall the menus displayed at the bottom of video pages.
- 3** ARROW key, used to display the second menu line. Used also to return quickly to the main «MANUAL» page when pressed together with the SHIFT key.
- 4** RUN key, used to start an operation. If used when the SEMIAUTOMATIC function key is active, it allows the sequential performance of the machining operation described in the individual lines of the program.

- 5** CTRL key (CONTROL) for fast cursor movement. Press it together with the LEFT arrow (11) or the RIGHT arrow (13) to move the cursor quickly from the first to the last character of a line and back.
- 6** SHIFT key. Press it together with the ARROW key to return quickly to the main «MANUAL» page.
- 7** Numerical keyboard, with digits 0 to 9, “-” for negative numbers, and “.” for decimal numbers.
- 8** ENTER key. Used to access the tables and to confirm selections made and data entered.
- 9** RUN signal led. If lit it signals that the NC is not in fault state;  
FAIL signal led. If lit it signals that the control is in fault state;  
ON signal led. If lit it signals that the NC is operating.
- 10** BS key. Deletes the first character to the left of the cursor.
- 11** LEFT ARROW key. Moves the cursor to the left.
- 12** DOWN ARROW key. Moves the cursor down.
- 13** RIGHT ARROW key. Moves the cursor to the right.
- 14** UP ARROW key. Moves the cursor down.
- 15** ESC key. Leaves the current table or cancels an operation.
- 16** DEL key. Deletes the selected character.
- 17** STOP key. Stops an operation.
- 18** CLR key (CLEAR) used to clear an error message on screen:  
led flashing = more than one error present;  
led on = one error present only;  
led off = no errors present.
- 19** RES key (RESET). Used to reset the numerical control after an emergency.
- 20** SEMIAUTOMATIC function key. When used together with the RUN key, it allows the execution of a program one step at the time.
- 21** JOG- key. Moves the axes manually in the negative direction.
- 22** SPEED key. Increases the jogging speed of the axes. Press it together with the JOG+ key to increase the speed of positive movements, and together with the JOG- key to increase the speed of negative movements.
- 23** JOG+ key. Moves the axes manually in the positive direction.
- 24** FRONT STOP SELECTION function key:  
led on = first row of stops selected;  
led off = second row of stops selected.
- 25** CLAMP STOP SELECTION function key:  
led on = selection for stop and panel clamping;  
led off = selection for stop only.
- 26** PUSHER SELECTION function key:  
led on = pushers enabled;  
led off = pushers disabled.
- 27** BALL-TYPE SUPPORT SELECTION function key:  
led on = ball-type supports enabled;  
led off = ball-type supports disabled.

- 28** DRIVE-A: for using diskettes. Warning. Do not remove the diskette when the led is lit.
- 29** OVERRIDE + key. Increases the programmed axis movement speed to the maximum permissible speed in 10% increments.
- 30** OVERRIDE - key. Decreases the programmed axis movement speed to the minimum permissible speed in 10% decrements.

## 2.2 THE SOFTWARE - DESCRIPTION

The software includes the pages displayed on the NC screen. It is functionally divided in sections, called "environments". Each environment contains "pages" which are used for programming and using the Numerical Control through the selection of appropriate menu items, options and commands.

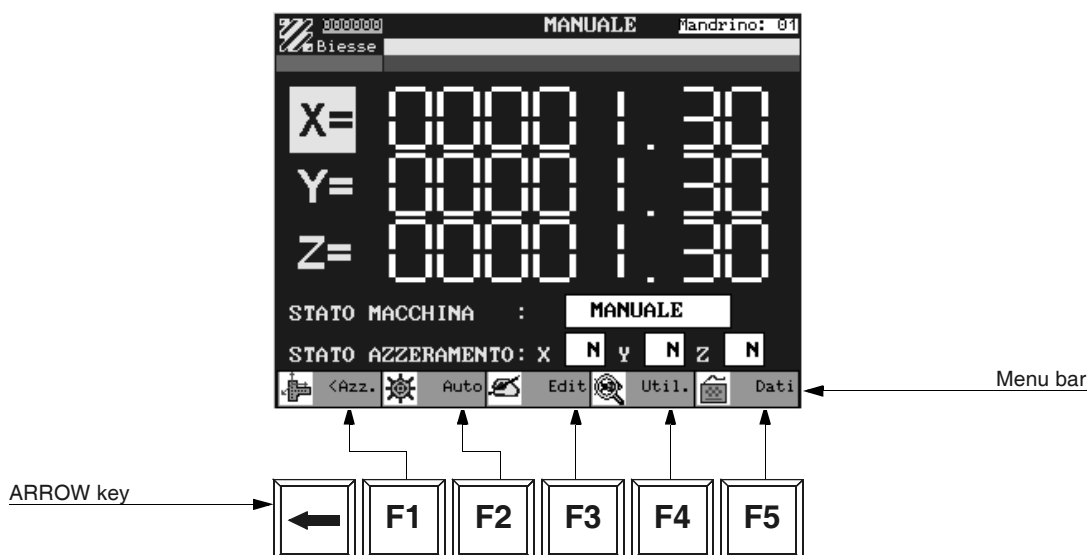
The software consists of the following environments:

- **Manual:**  
Allows the movement of the axes, the forced descent of spindles and slots, and contains a single «MANUAL» page.
- **Editor:**  
Used to prepare the programs used to machine the panels. It consists of the pages:  
«EDITOR\PROGRAM DATA»;  
«EDITOR\ASSISTED»;  
«EDITOR\OPTIMISED BORINGS»;  
«EDITOR\SIMULATION».  
This environment also envisages a "profile programming" editor, which is contained in the «CAD» page.
- **Automatic:**  
Controls the execution of the programs prepared for the machining of the panels. It consists of the pages:  
«AUTOMATIC\PROGRAM»;  
«AUTOMATIC\LIST».
- **Setup:**  
Allows the set-up of the machine and contains the pages:  
«UTIL\MAINTENANCE»;  
«UTIL\CONFIGURATION»;  
«UTIL\DEBUGGER»;  
«DEBUG\SYSTEM MONITOR»;  
«DATA\GENERAL DATA»;  
«DATA\AXES PARAMETER»;  
«DATA\HEAD CORRECTION»;  
«DATA\TOOL TABLES»;  
«DATA\TOOLING»;  
«DATA\DRILL-BIT CYCLES»;  
«DATA\MAGAZINE MANAG.»;  
«DATA\AGGREGATES».

### 2.2.1 Selecting menu, options and commands

To select one of the 5 menus displayed in the lower section of the page, press:  
the F1 key for the first menu from the left, F2 for the second, F3 for the third, F4 for the fourth and

F5 for the fifth. If the first menu on the left shows a "<", more menus are available, and can be displayed with the ARROW key.



To select the options that are displayed after having selected a menu, move the cursor to the required option using the UP ARROW or DOWN ARROW keys (or RIGHT and LEFT is necessary), then press the ENTER key to confirm the selection when the cursor is on the required option. Options containing the symbol ">" contain further options. The commands are selected like the options.

### 2.2.2 Accessing tables and work lists

Use the UP, DOWN, RIGHT, LEFT ARROW keys to move the cursor to the required table (the header turns red), and press the ENTER key to access the data entry fields. To cancel the selection, press the ESC key and scroll the cursor to another table. Use the same procedure for the work lists.

### 2.2.3 Accessing data entry fields

Use the UP, DOWN, RIGHT, LEFT ARROW keys to select the required field (highlighted in red) and enter the data. Press the ENTER key to confirm the data. If the ENTER key is not pressed, the previous value will be retained.

Fields with the symbol ▼ are called "toggle" fields and contain preset items. To select these items, press any key on the numerical keyboard and confirm the required item with the ENTER key.

Fields with the symbol □ can accept alphanumeric characters.

### 2.2.4 Entering alphanumeric characters

Press at the same time the SHIFT and ENTER keys on the symbol □ to display a table containing all letters and symbols necessary for writing.

Move the cursor to the required character and press the ENTER key to copy the character to the line you are writing. To delete a character, use the BS key.

After typing the required text, leave the table with the ESC key. Press the ENTER key to confirm the data. If the ENTER key is not pressed, the previous value will be retained.

## 2.2.5 Password information

A password is required when changing the data in the <Data> and <Util> menus.



### CAUTION

**The password may be used only by the NC operator for tooling, changing the language of the software, and backing up or restoring the data.**

### Entering the password

Entering the password enables permanent saving of the data.

- 1) From the «MANUAL» page choose the <Util> menu and the option <Maintenance>.
- 2) Select the <Passw> menu. Now type the number 210 and press the ENTER key. If the password has been entered correctly, the message “Level SUPERV” will be displayed.
- 3) Press the ESC key to quit.

### Removing the password

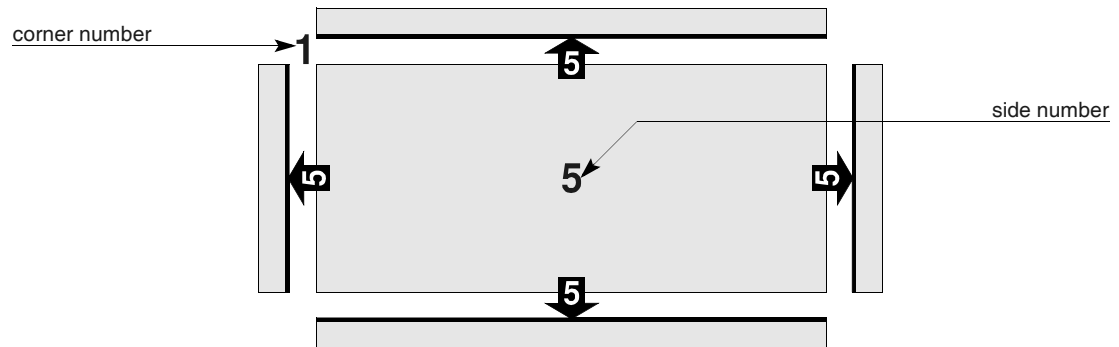
Removing the password will disable permanent saving of data. This function is useful to protect the data from permanent changes, but still allow the data to be changed temporarily. When the NC is turned on again, the previous data will be restored.

- 1) From the «MANUAL» page choose the <Util> menu and the <Maintenance> option.
- 2) Select the <Passw> menu. Enter the number 0 (zero) and press the ENTER key. The message “Level 0” will displayed if the password has been removed correctly.
- 3) Press the ESC key to quit.

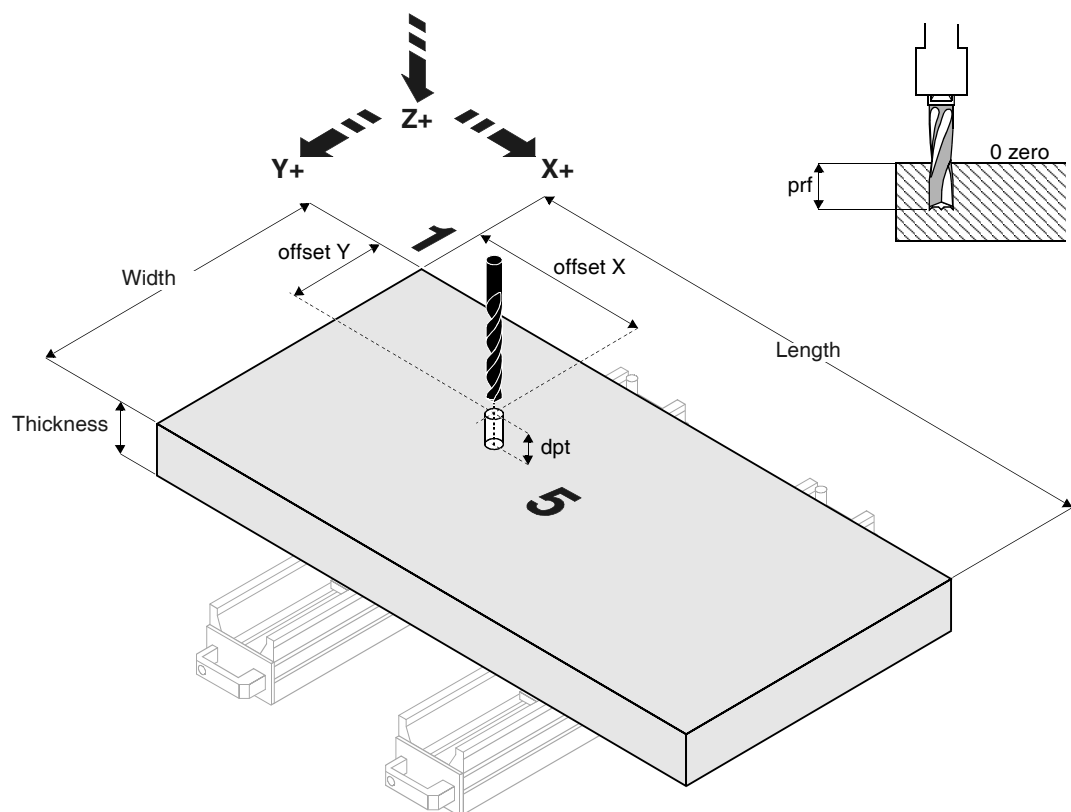
## 2.2.6 Panel layout

During programming, the video will show a drawing of the panel to be machined. The figure contains numbers indicating the sides and the corners of the panel. Side no. 5 refers to the upper

side of the panel resting on the work table. Corner 1 is the corner formed by the left-hand side with the rear side of the panel resting on the work table.

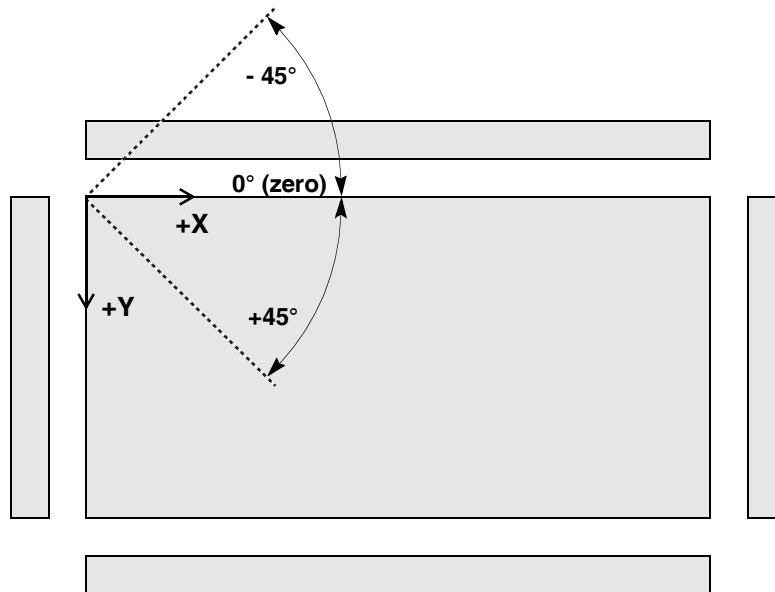


Example: Number 5 indicates the side to be machined and therefore the zero of the machining depth (dpt). The number 1 indicates the reference corner for the machining dimensions (offset X, Y).





## 2.2.7 Axes and angles



## 2.2.8 Zoom and panning

These modes are used to better display some parts of the panel during programming. The table below contains the key combinations and the corresponding functions..

Zoom functions	CTRL+UP ARROW	Enlarge of a percentage
	CTRL+DOWN ARROW	Shrink by a percentage
Panning functions	SHIFT+UP ARROW	Move up
	SHIFT+DOWN ARROW	Move down
	SHIFT+LEFT ARROW	Move left
	SHIFT+RIGHT ARROW	Move right

In addition, during programming of CAD profiles the user may carry out a zoom on the base design or on the panel.

To perform a zoom on the base design, proceed from the <CAD> page, selecting <Menu>, then <Zoom menu> followed by <Zoom on design>.

To perform a zoom on the panel, proceed from the «CAD» page, selecting <Menu>, then <Zoom menu> followed by <Zoom on panel>.

## 2.2.9 Accessing the numbering of spindles and slots

- 1) From the «MANUAL» page select the <Reset> menu, and the <MDI> option.
- 2) Press the ENTER key on fields <+> and <-> to identify, on the upper section of the popup that opens, the spindle number (in fuchsia) and the diameter of the tool mounted (e.g. D=10.00).
- 3) To close the popup press the ESC key.

**INFORMATION**

The numbering of spindles and slots is described in the “User Manual” of the machine.

### 2.2.10 Displaying the operation status

To display the operation status, access the «MANUAL» page. The field will display one of the following conditions:

- **MANUAL:**  
indicates that the machine is enabled for axis reset.
- **AUTOMATIC:**  
indicates that the machine is executing a program.
- **ALARM:**  
indicates that the machine is in emergency status.
- **JOG:**  
indicates that the axes are being jogged.

### 2.2.11 Accessing the calculator

- 1) To access and use the calculator, from the «MANUAL» page select the <Util> menu and the <Maintenance> option.
- 2) Press the ARROW key and select the <Calc> menu. To do calculations, move the cursor to the relevant field and press the ENTER key.
- 3) To quit the calculator function, press the ESC key.

### 2.2.12 Displaying software information

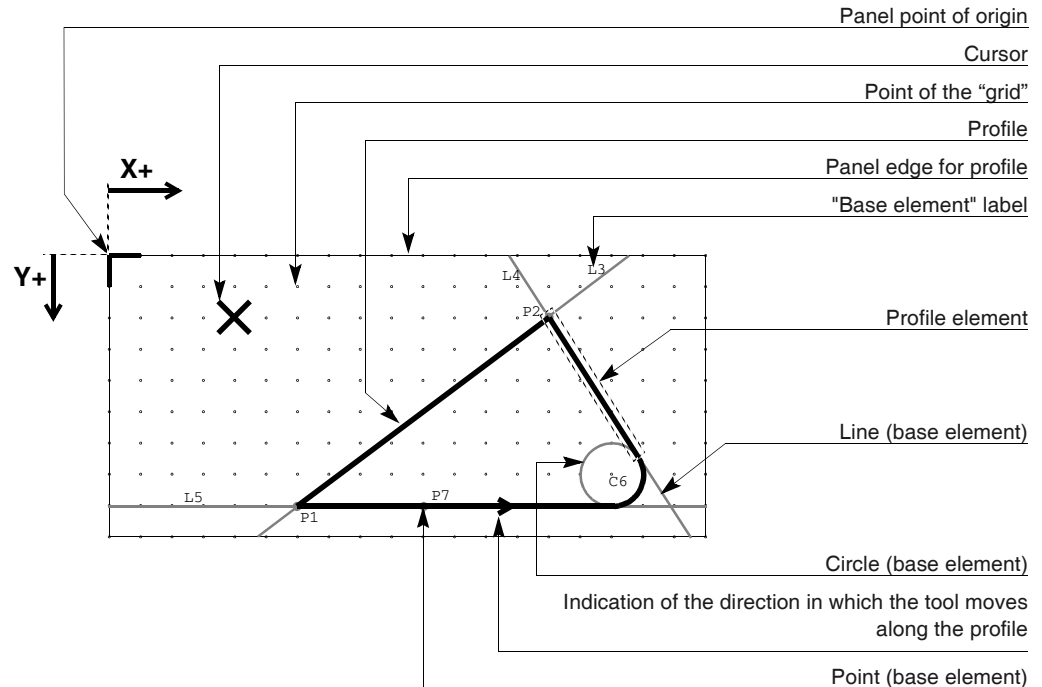
From the main page «MANUAL» select the <Util> menu and the <Maintenance> option. The upper part of the screen will show a table with the identification of the software installed.

### 2.2.13 Adjusting the brightness of the screen

From the «MANUAL» page, keep the SHIFT key pressed and press repeatedly one of the ARROW keys (UP, DOWN, RIGHT, LEFT) until the required brightness has been obtained. To save the setting, access any other page.

## 2.2.14 «CAD» page procedures and information

The following is a description of the graphics area of the «CAD» page.



### Description of the base element label

Labels consist of a letter and a number. The letter identifies the type of base element:

- "C" identifies a CIRCLE,
- "L" identifies a LINE,
- "P" identifies a POINT.

The number identifies the sequential order in which the elements have been drawn (e.g.: if the first element drawn is a circle = C1; if the second element drawn is a point = P2; if the third element drawn is a line = L3; etc.).

### Description of colours in the CAD graphics area

In normal conditions:

- base elements GREEN,
- label YELLOW,
- temporary multiple solutions DARK BLUE.

During selection of base elements or profile elements:

- elements which can be selected DARK BLUE
- element which has been selected WHITE.

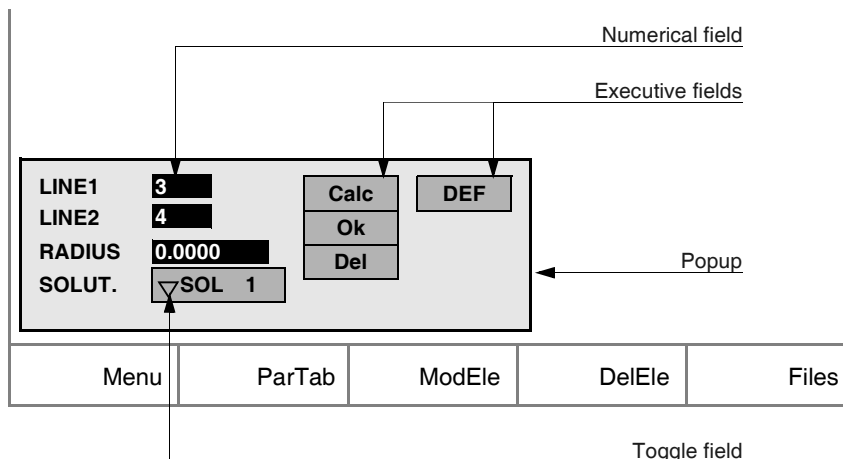
During creation of the profile:

- profile or part of profile created LIGHT BLUE
- current element WHITE
- multiple solutions (points or arcs) RED

During selection of profiles:  
 profiles which can be selected DARK BLUE  
 profile which has been selected RED.

### Information about the fields in the «CAD» page popups

The types of field which may be found in the popups are those illustrated below.



The "executive fields" allow the user to perform the functions listed below.

<Ok> to confirm the operation and exit.

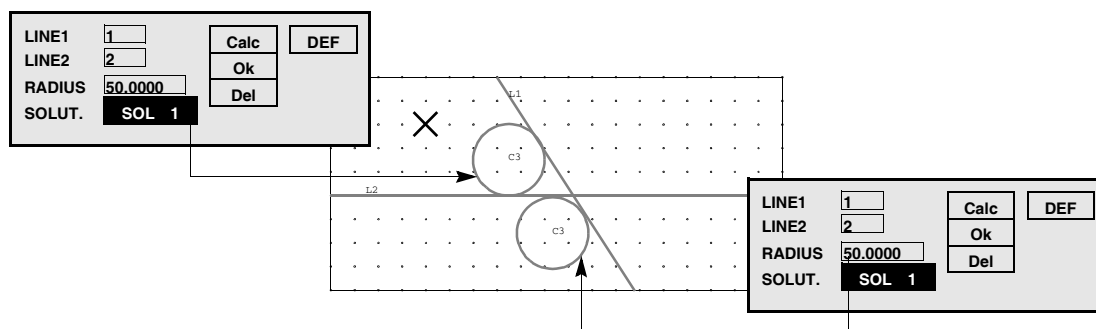
<Del> to abort the operation.

<Calc> to repeat the calculations proposed in the solutions.

<DEF> to open the popup containing the default data of the element. Press ENTER on the <Ok> field to exit from the popup and break the relationship bond between the elements, or press ENTER on the <Del> field to exit without breaking the bond; for information about the relationship bond between elements, refer to "Relationship bond between base elements" "Relationship bond between the base elements" (page 6-4).

The "numerical fields" are used to indicate dimensions, coordinates, label numbers, etc., relating to the base elements selected or to be included in the design.

The "toggle fields" contain a preset number of geometrical solutions (also known as "temporary multiple solutions") which can be scrolled through with a number key. To confirm the selection made, press ENTER.



### Moving the open popup around the «CAD» page

If the open popup is overlapping the part of the design of interest to the user, it can be moved to the four corners of the graphics area by selecting the <Move> menu.

### Selecting the elements in the base design.

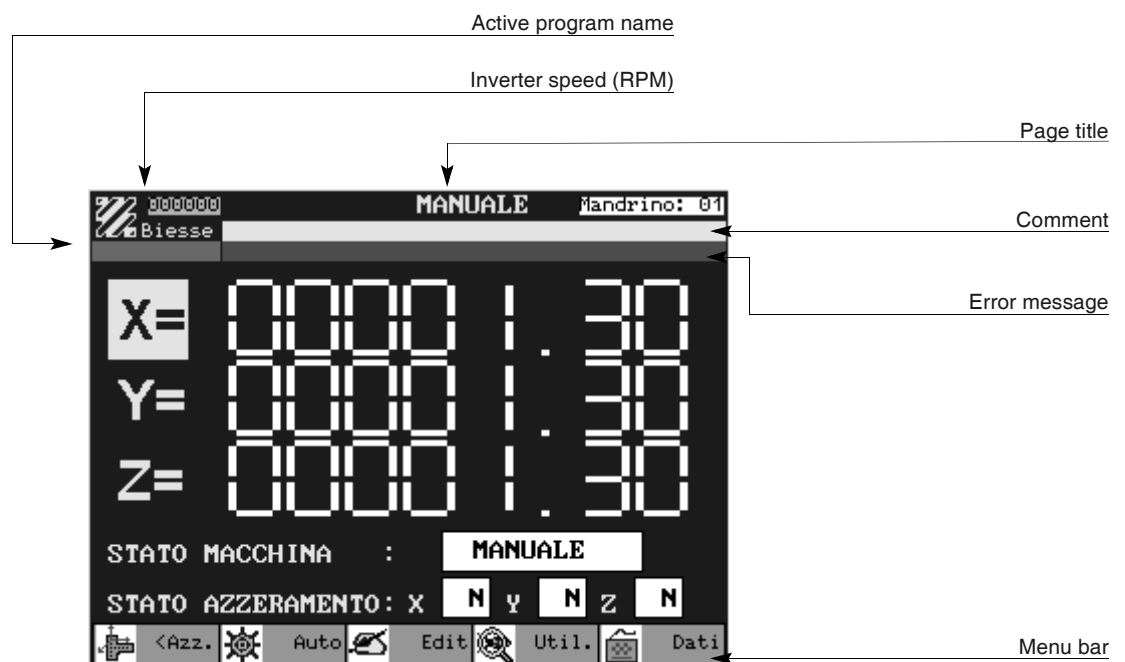
Locate the cursor on the element to be selected and press ENTER; the element selected will turn WHITE. If it turns DARK BLUE, the arrow keys can be used to transfer the selection onto other elements, which will also turn DARK BLUE during the selection process; press ENTER to confirm the choice of the element, which will turn WHITE.

### Selecting elements within the profile

When a panel contains more than one profile and the user requests any operation on them (copy, move, delete, compensation, etc.), the user must select the profile on which he wishes to work. To select a profile, locate the cursor on one of its elements (arc or segment) and press ENTER; the selected profile will turn RED. If it turns DARK BLUE, the arrow keys can be used to transfer the selection onto other profiles, which will also turn DARK BLUE during the selection process; press ENTER to confirm the choice of the profile, which will turn RED.

## 2.3 DESCRIPTION OF SOFTWARE PAGES

The figure below shows all the fields common to all the NC pages.

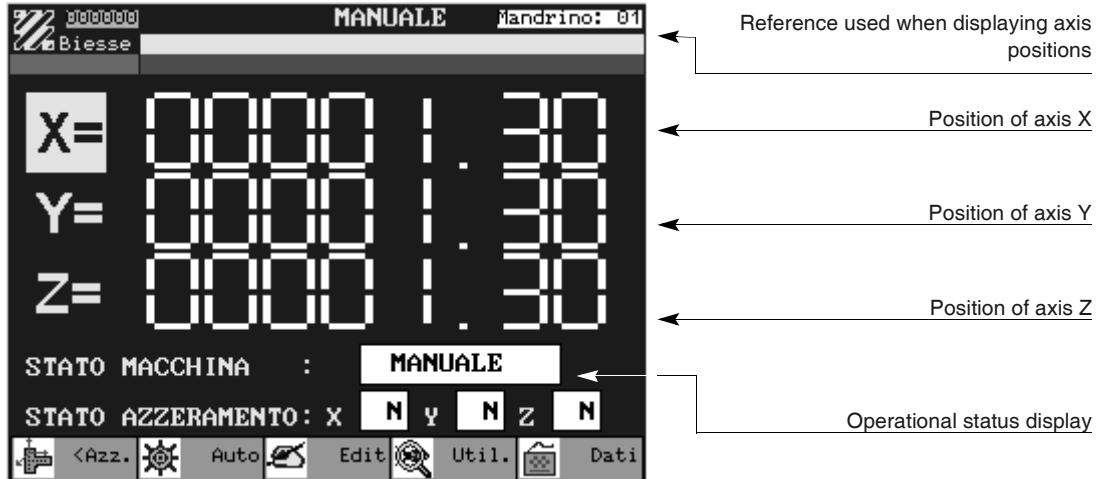


### 2.3.1 Manual environment page

This environment contains the following page:

### «MANUAL» page

It is the only page in this environment, and it is considered the main page of the software. This page allows you to reset the axes, jog the axes, display the operational status of the machine, display the position of the axes and identify the spindle numbers.



To access the page:

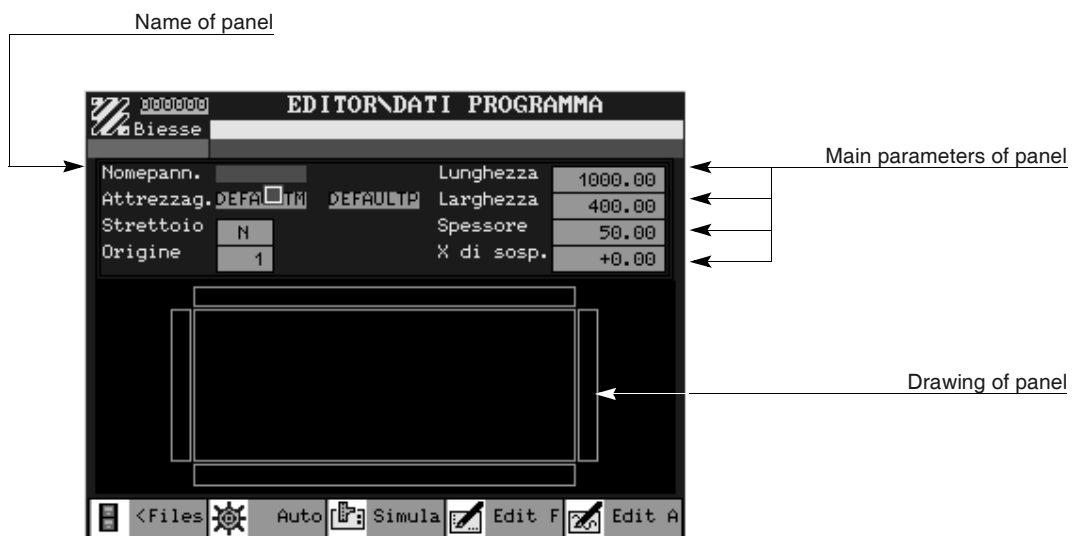
Keep the SHIFT key pressed while pressing the ARROW key.

## 2.3.2 Editor environment pages

This environment contains the following pages

### «EDITOR\PROGRAM DATA»

Allows performing the main basic programming operations.

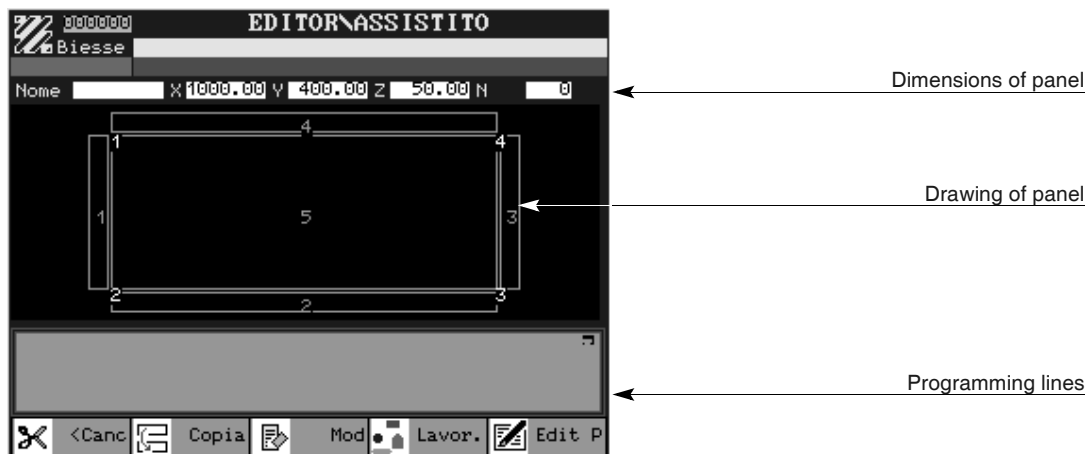


To access the page:

from the «MANUAL» page select the <Edit> menu and the <Programs> option.

**«EDITOR\ASSISTED»**

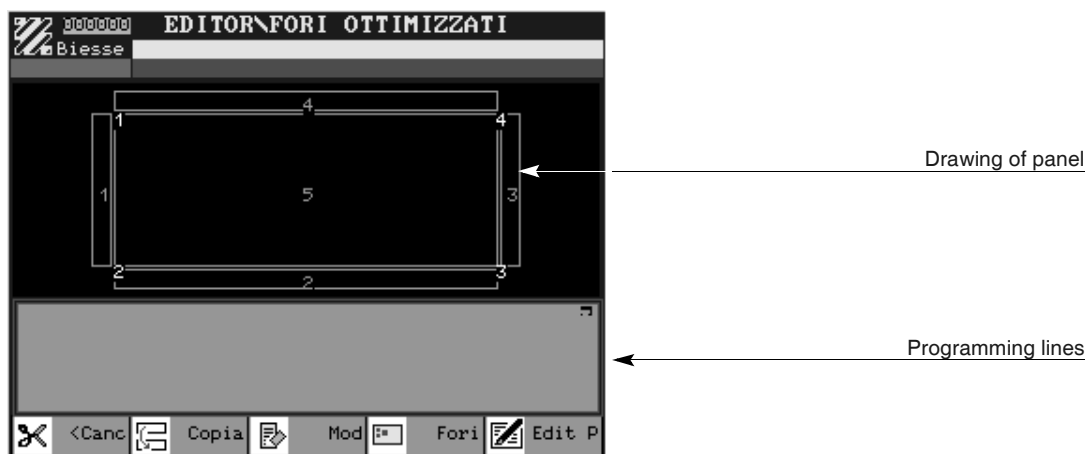
Allows programming of routing operations, cuts, non-optimised borings, and program pauses.



To access the page:  
from the «MANUAL» page select the <Edit> menu and the <Ass.Editor> option.

**«EDITOR\OPTIMISED BORINGS»**

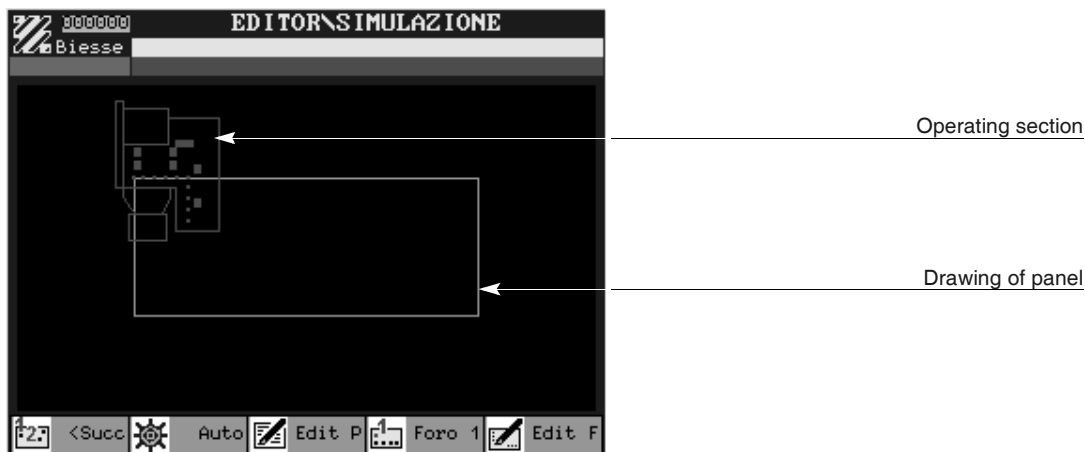
Allows programming of the “optimised” borings to be made with the spindles of the boring head.



To access the page:  
From the «MANUAL» page select the <Edit> menu and the <Boring Edit> option.

## «EDITOR\SIMULATION»

Allows the simulation of the machining phases of the open program.

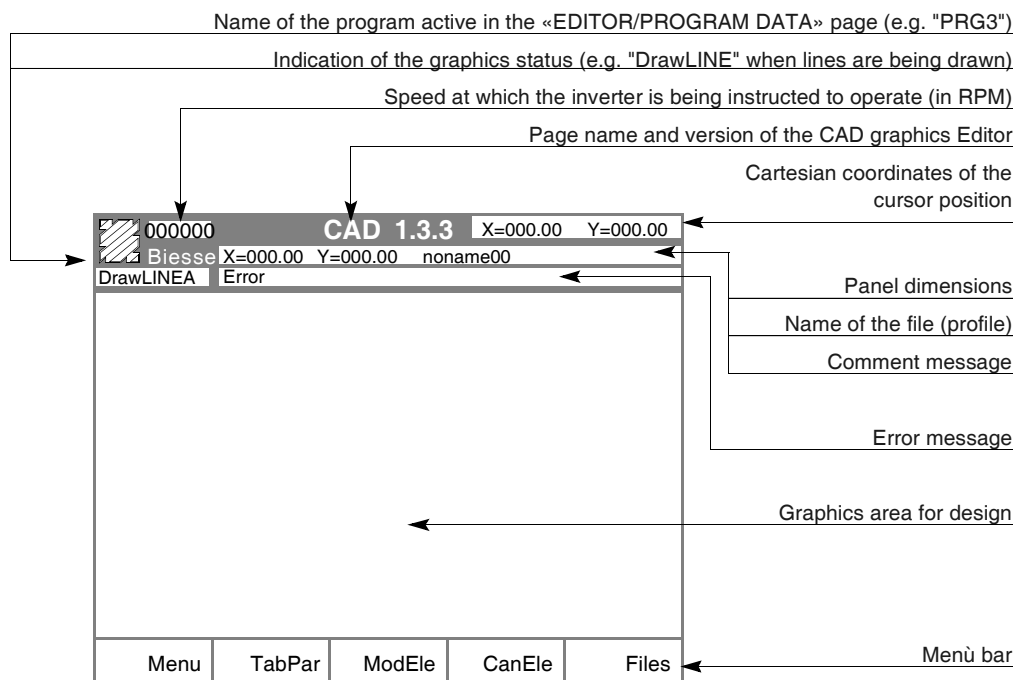


To access the page:

From the «MANUAL» page select the <Edit> menu and the <Simulation> option.

## «CAD» page

This is the CAD (graphics editor) page present in the NC. It allows the user to draw the profiles.



To access the page proceed as follows:

from the «Manual» page select the <Edit> menu and the <CAD> option.

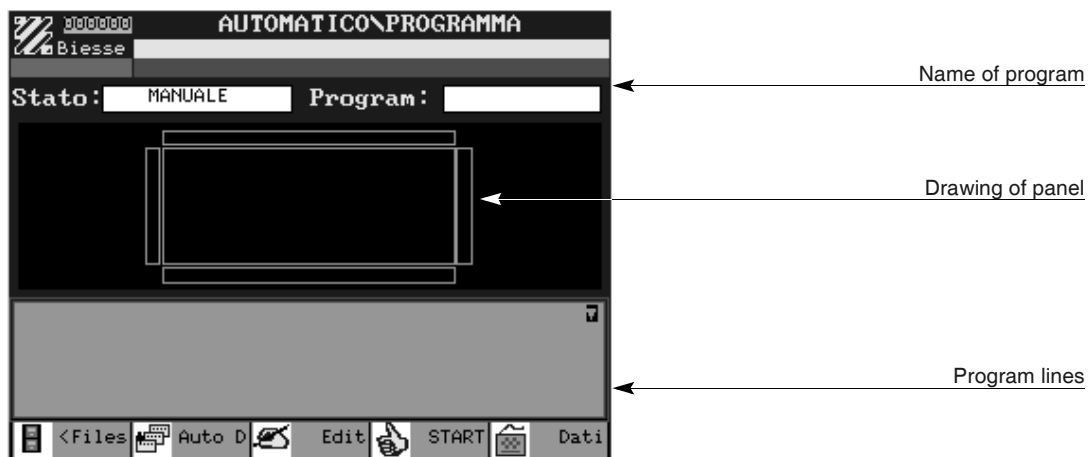


### 2.3.3 Automatic environment pages

This environment contains the following pages.

#### «AUTOMATIC\PROGRAM»

Allows execution of a single program.

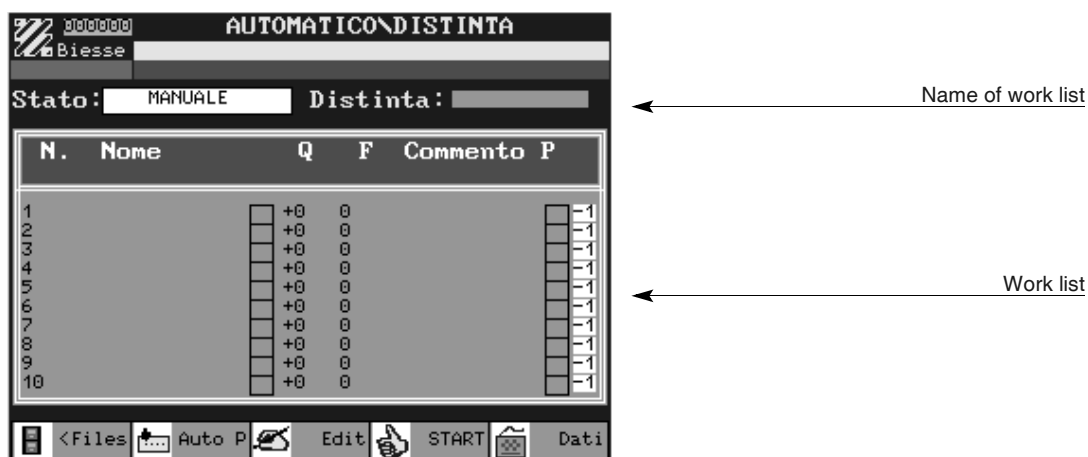


To access the page:

From the «MANUAL» page select the <Auto> menu and the <Programs> option.

#### «AUTOMATIC\LIST»

Allows you creation and execution of a “work list”, which organises the work of the machine. Work lists consist of a list of programs, each associated to a number of panels to machine.



To access the page:

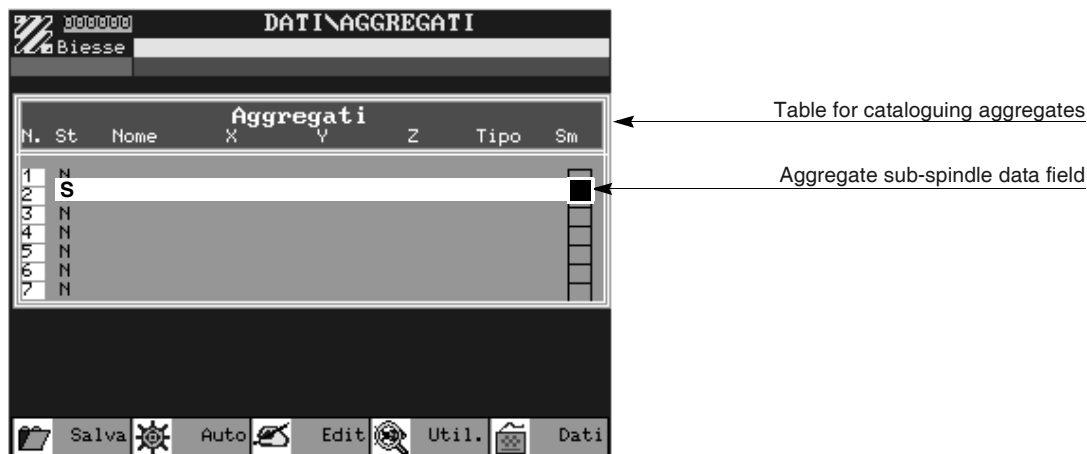
From the «MANUAL» page select the <Auto> menu and the <Work Lists> option.

### 2.3.4 Setup environment pages

This environment contains the following pages.

#### «DATA\AGGREGATES»

Allows you to define the “aggregates”, that is the special function chucks and adapters that may be installed on the slots of the operating section (see also the “User Manual” of the machine).

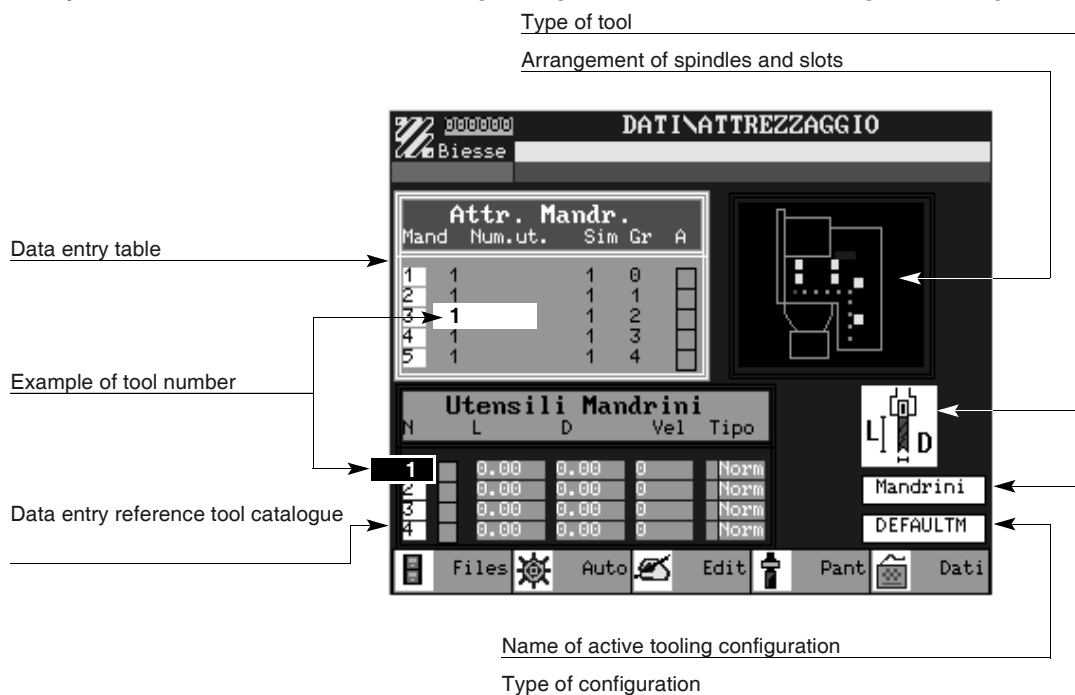


To access the page:

From the «MANUAL» page select the <Data> menu and the <Aggregates> option.

#### «DATA\TOOLING»

Allows you to create and enable the tooling configurations to be used during machining.



To access the page:

From the «MANUAL» page select the <Data> menu and the <Tooling> option.

## «DATA\MAGAZINE MANAG.»

Allows configuration of the magazine tool holders with tools or aggregates which will be used on the slots during automatic tool change (see the “User Manual” of the machine).

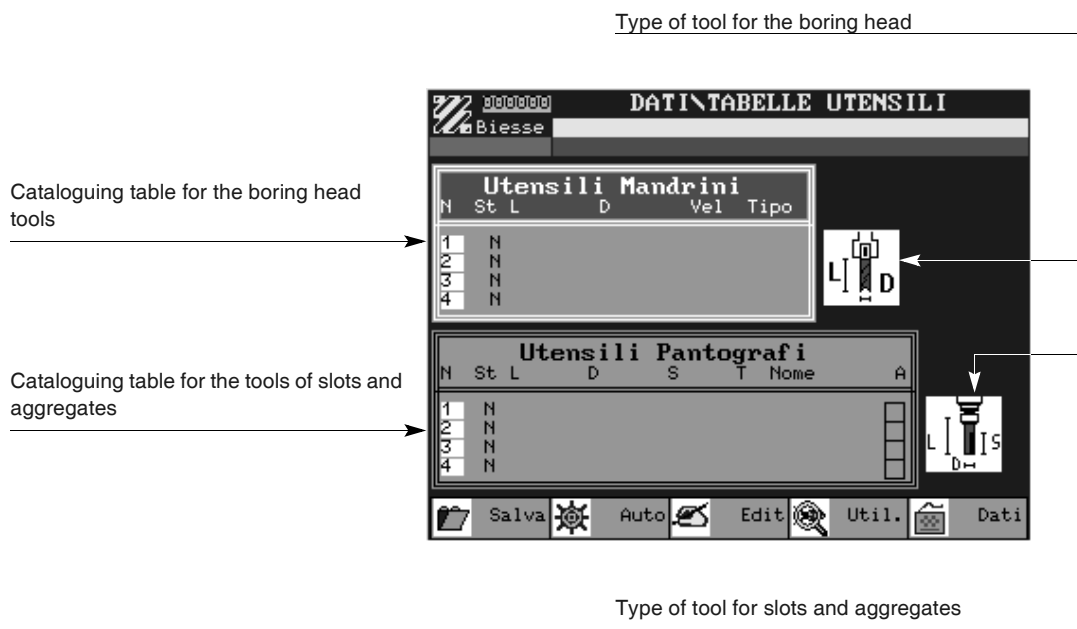


To access the page:

From the «MANUAL» page select the <Data> menu and the <Magazines> option.

## «DATA\TOOL TABLES»

Allows you to catalogue all the tools that may be employed in the tooling configurations, the page is specifically separated into two tables, one for the spindles of the boring head “Spindle Tools” and the other for the slots “Router Tools”.



To access the page:

From the «MANUAL» page select the <Data> menu and the <Drill-b. data> option.

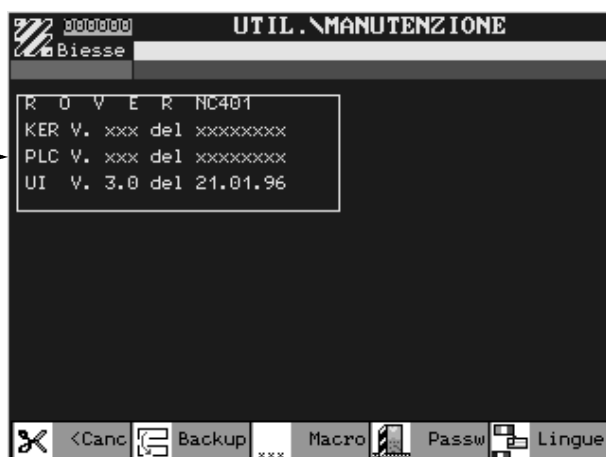
## «UTIL\MAINTENANCE»



## CAUTION

The <Del> menu is reserved for BIESSE technicians. It may be used by the operator only with the authorisation and under the guidance of a BIESSE technician.

Software information table



To access the page:

From the «MANUAL» page select the <Util> menu and the <Maintenance> option.

# Chapter 3

## USING THE NUMERICAL CONTROL

### 3.1 TURNING ON THE NUMERICAL CONTROL

The numerical control is turned on with the machine (see the “User Manual” of the machine).

### 3.2 RECOVERING FROM AN EMERGENCY CONDITION

When the numerical control is first turned on, or if an emergency condition arises, the <ALARM> message is displayed in the <MACHINE STATUS> field of the <MANUAL> page.

- 1) Reset all the emergency devices installed on the machine. Refer to the “User Manual” of the machine for the location of the emergency devices.
- 2) Press in sequence the STOP, the RES, and the CLEAR keys to clear any error displayed on screen.

The same method is employed to clear an alarm condition occurred during the work cycle of a program.

### 3.3 AUTOMATIC AXIS RESET

By resetting the axes we indicate a procedure whereby the axes are moved to a specific and known position to allow the machine to determine the exact position of the axes with respect to the origins of the working table. The axes have to be reset every time before starting any machining operation. It is not necessary to reset the axes, however, before entering programming data.



#### CAUTION

**Ensure that the axes are free to move and no obstacles are present in their path before proceeding with the operation.**

- 1) From the «MANUAL» page, select the <Reset> menu and the <Auto.reset> option.
- 2) Enter XYZ in the field <Ax> and press the ENTER key on the <START> field. The axes are reset automatically. To cancel the procedure, select <CANCEL> and press the ENTER key.

If the axes have been reset correctly, the letter “Y” (Yes) will be displayed next to every item of the field <RESET STATUS> (X, Y, Z) in the «MANUAL» page.

## 3.4 MANUAL AXIS RESET



### CAUTION

The axes may be reset manually only with the authorisation and under the supervision of BIESSE personnel. For further information on the matter, contact BIESSE Service Dpt.

## 3.5 JOGGING THE AXES



### CAUTION

Ensure that the axes are free to move and no obstacles are present in their path before proceeding with the operation.

- 1) From the «MANUAL» page, scroll the cursor to the axis to move, and press the ENTER key to select it.
- 2) Move the axis using the JOG+ and JOG- keys. To move the axis faster, press the SPEED key together with the JOG+ or JOG- key
- 3) When the axes have been moved to the required position, place the cursor on the axes that had been selected and press the ENTER key. It is advisable to perform an automatic axis reset after jogging.

## 3.6 FORCING THE DESCENT OF SPINDLES AND SLOTS

- 1) From the «MANUAL» page select the <Reset> menu and the <MDI> option.
- 2) Press the ENTER key on the <+> and <-> fields to move the cursor to the spindle or slot to be lowered, which turns fuchsia in colour.
- 3) Press the ENTER key on the <On> field to lower the selected spindle or slot. To reposition the spindle or slot to their initial position, press the ENTER key on the <Off> field. Before leaving the popup menu, ensure that all spindles or slots which have been lowered, have been restored to their initial position.
- 4) To leave the popup, press the ESC key.

## 3.7 FORCING THE OPENING OF THE TOOL MAGAZINES

- 1) From the «MANUAL» page select the <Data> menu and the <Magazines> option.
- 2) In the <Number> field, enter the number of the magazine to be opened and press the ENTER key.
- 3) To open the magazine cover, select the <Open> menu. Ensure that the cover is closed afterwards with the <Close> menu.
- 4) To open the cover and raise the tool holder, access the «Magazine Data» table and move the cursor to the line of the tool holder. Enter ON in the <Force> field. Afterwards, restore the initial position of the tool holder by entering OFF in the same <Force> field.

### 3.8 STARTING THE EXECUTION OF A PROGRAM

This procedure consists in preparing a program to start the work cycle. It can be executed either from the «AUTOMATIC\PROGRAM» page or from the «EDITOR\PROGRAM DATA» page.

- 1) From the «MANUAL» page select the <Auto> menu and the <Programs> option to access the «AUTOMATIC\PROGRAM».
- 2) To open the program to execute, select the <Files> menu.
- 3) Press the ENTER key to access the list. Scroll the cursor to the required program and press the ENTER key to select it.
- 4) Press the ENTER key on the <OK> field to confirm the selection and open the program.
- 5) Select the <START> menu. The program is optimised and prepared for starting the work cycle. If the slots remain low, press the RES key, and then the RESET button on the electrical cabinet (refer to the “User Manual” of the machine).
- 6) Before actually starting the work cycle, it is possible to run a simulation of the program to check the execution steps. Press the ARROW key and select the <Simula> menu to access the «EDITOR\SIMULATION» page from which the simulation procedure may be launched (see paragraph 3.8.1).
- 7) For the procedure concerning the work cycle start, please refer to the “User Manual” of the machine.

#### 3.8.1 Running a simulation of the program

- 1) From the «EDITOR\SIMULATION» page, select the <Hole 1> menu to determine the first step (initial point) of the program.
- 2) To determine the next step, select the <Next> menu, and continue until the machine returns to the first step.

#### 3.8.2 Stopping a program during execution

- 1) Press the STOP key to stop the movement of the axes.
- 2) Press the RES key to stop the execution of the program.
- 3) Press the RUN key to resume the execution of the program and the movement of the axes.

#### 3.8.3 Starting a program in semiautomatic mode

This procedure allows the program to be executed by individual steps.

- 1) Press the SEMIAUTOMATIC function key.
- 2) For the procedure relative to starting the work cycle, please refer to the “User Manual” of the machine.
- 3) When the led of the SEMIAUTOMATIC function key flashes, press the RUN key to execute the first step of the program.
- 4) To execute the next step press the RUN key. Repeat for each subsequent step.
- 5) To stop the semiautomatic execution of the program press the SEMIAUTOMATIC function key.

### 3.8.4 Resuming the execution of a program after a “WAIT C/TRASL” stop

- 1) Select the opposite work area by pressing the corresponding START button (flashing) on the machine.
- 2) Move the panel to the selected area and place it against the stops. Press the clamp pedal (see the “User Manual” of the machine).
- 3) To resume the execution of the program confirm the selection of the work area by pressing the corresponding START button on the machine. If the program contains no other stops, it will be executed to the end.

### 3.8.5 Resuming the execution of a program after a “WAIT C/SBLOC” stop

- 1) Select the work area containing the panel by pressing the corresponding START button (flashing) on the machine.
- 2) Tilt the panel and place it against the stops. Press the clamp pedal (see the “User Manual” of the machine).
- 3) To resume the execution of the program confirm the selection of the work area by pressing the corresponding START button on the machine. If the program contains no other stops, it will be executed to the end.

### 3.8.6 Resuming the execution of a program after a “WAIT S/SBLOC” stop

- 1) Clean the work area containing the panel.
- 2) To resume the execution of the program, press the flashing START button on the machine. If the program contains no other stops, it will be executed to the end.

## 3.9 SELECTING A WORK LIST FOR EXECUTION

This procedure consists in preparing a work list (list of programs) to start a work cycle. It can be executed from the «AUTOMATIC\PROGRAM» page.

- 1) From the «MANUAL» page select the <Auto> menu and the <Work Lists> option to access the «AUTOMATIC\LIST» page.
- 2) To open the work list to be executed, select the <Files> menu and the <Open> option.
- 3) Press the ENTER key to access the listing. Scroll the cursor to the required work list and press the ENTER key to select it.
- 4) Press the ENTER key on the <OK> field to confirm the selection and open the work list.
- 5) Access the work list and move the cursor to the line containing the program to be executed first, then select the <START> menu. The programs will be executed sequentially in the order they appear in the work list.
- 6) Select the <START> menu. The program is optimised and prepared for starting the work cycle. If the slots remain low, press the RES key, and then the RESET button on the electrical cabinet (refer to the “User Manual” of the machine).
- 7) For the procedure relative to starting the work cycle, please refer to the “User Manual” of the machine.

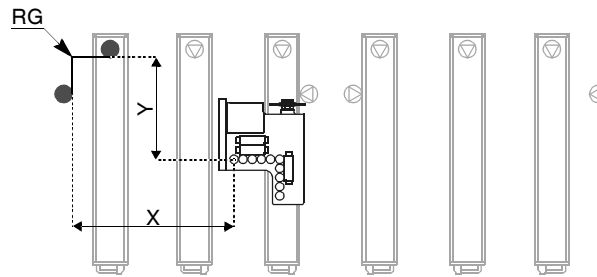


### 3.10 DISPLAYING THE POSITION OF THE AXES

The position of the axes can be displayed from the «MANUAL» page only. Proceed as follows:

#### 3.10.1 Position of the axes of spindle 1 in relation to the origins

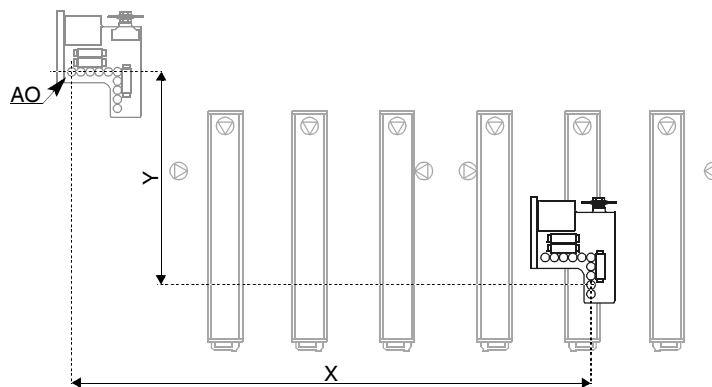
Used to determine the distance of spindle 1 of a boring head from the origin (RG) of the working table.



- 1) From the «MANUAL» page press the ARROW key and select the <Value> menu, then the <Comp. to origin> option.
- 2) In the <Origin> field enter the number of the required origin and press the ESC key to display the position of the axes.

#### 3.10.2 Position of the axes of the spindles in relation to the absolute origin

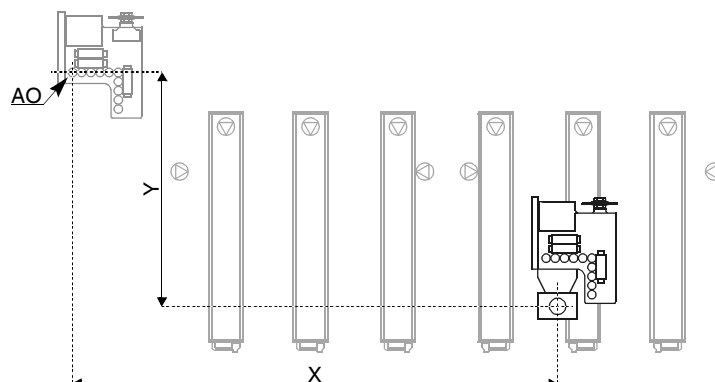
Used to determine the distance of a spindle of the boring head from the absolute origin (AO).



- 1) From the «MANUAL» page press the ARROW key and select the <Value> menu, then the <Comp. to spindles> option.
- 2) In the <Spindle> field enter the number of the required spindle and press the ESC key to display the position of its axes.

### 3.10.3 Position of the axes of the slots in relation to the absolute origin

Used to determine the distance of a slot from the absolute origin (AO).



- 1) From the «MANUAL» page press the ARROW key and select the <Value> menu, then the <Regarding slot> option.
- 2) In the <Slot> field enter the number of the required slot and press the ESC key to display the position of its axes.

## 3.11 BACKING UP AND RESTORING DATA

The backup procedure is used to create a copy of the data of the machine, so that this data can be re-loaded if necessary. The data is re-loaded with the restore procedure. All data relative to the configuration of the machine (as set up by BIESSE personnel during the final testing) are classified as “machine data”. The data relative to configuration and programs created by the user are classified as “user data”.



### INFORMATION

**The machine is supplied with 2 diskettes for the Numerical Control. One contains a program for loading the software, and the other contains the original “machine data”.**

#### Backing up and restoring “Machine Data”

- 1) Insert the disk in DRIVE A. From the «MANUAL» page select the <Util> menu and the <Maintenance> option.
- 2) Enter the password. Select the <Backup> menu and the <Mac. data> option.
- 3) Press the ENTER key to open the list, and select the type of data, then press the ENTER key. The table below shows the type of data that may be selected:

ALL_DATA	All the machine data files
SPIND.DATA	Offsets of boring head spindles
ROUT DATA	Offsets of slots
SPIND.DRILL	cataloguing of tools for boring head
ROUT DRILL	cataloguing of tools for slots and aggregates

AXES PARAM	parameters of axes
SETUP DATA	general machine setup
ORIGIN DATA	origin offset
D.BIT CYCLE	bit cycles
LANG.	language resources of software
MC. DATA	general machine data
MAG. DATA	offset of tool holders in the magazines
AGGREG. DATA	cataloguing of aggregates
TOOLING DATA	all tooling configurations that have been created
BARCODE DATA	barcodes
PLC DATA	PLC constants
DXF DATA	setup for reading *.DXF files

- 4) To execute a backup, set <CNC> in the <Source> field, and set <A:> in the <Destination> field. To restore the data, set instead <A:> in the <Source> field, and <CNC> in the <Destination> field.
- 5) To cancel the procedure, press the ESC key. To confirm press the ENTER key on one of the <OK> fields.

#### Backing up and restoring “User Data”

- 1) Insert the disk in DRIVE A. From the «MANUAL» page select the <Util> menu and the <Maintenance> option.
- 2) Enter the password. Select the <Backup> menu and the <User data> option.
- 3) Press the ENTER key to open the list, and select the type of data, then press the ENTER key. The table below shows the type of data that may be selected:

ALL_DATA	All user data files
PROGRAMS	macro for optimised borings and programs made.
LISTS	work lists made by the user
SPIN. TOOLIN	tooling configurations created for the boring head
ROUT. TOOLIN	tooling configuration created for the slots
CAD PROFILE	CAD profiles created by the user
MACRO DEPTH	macro for routing operations

- 4) In the <Source> field, set <CNC> to perform a backup, or <A:> to restore. In the <Files> field enter the name of the files. When writing the name, the wildcard character \* (asterisk) can be used as in the DOS operating system.
- 5) In the <Destination> field, set <A:> to perform a backup, or <CNC> to restore. In the <Files> field enter the name of the files. When writing the name, the wildcard character \* (asterisk) can be used as in the DOS operating system.

- 6) To cancel the procedure, press the ESC key. To confirm, press the ENTER key on one of the <OK> fields. The <OK?> field is used to exclude the required files. The <OK> field executes the procedure immediately.

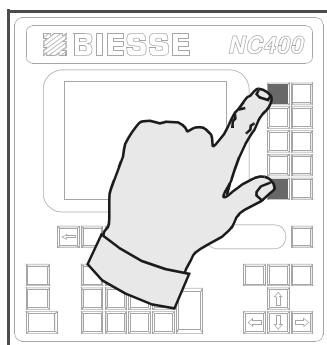
### 3.12 LOADING THE SOFTWARE



#### CAUTION

**This procedure is to be performed only in the events of problems, using the disk provided. The operator should proceed with this procedure only if authorised and supervised by BIESSE personnel. Before proceeding with this operation it is advisable to backup all the data onto a floppy disk.**

- 1) Turn the NC off and insert the disk in DRIVE A.
- 1) Press the key used to select the front row of stops and the CLEAR key at the same time. Turn on the Numerical Control while keeping the two keys pressed..



- 2) Release the keys only when the video displays the message "init floppy". Do not press any other key and wait until the «MANUAL» page is displayed.
- 3) Remove the disk used for re-loading the software. If necessary, restore all the data from the last backup.

### 3.13 CHANGING THE LANGUAGE OF THE SOFTWARE

- 1) From the «MANUAL» page select the <Util> menu and the <Maintenance> option.
- 2) Select the <Langu.> menu, the <Load from A:> option, and the required language. Wait until the language is loaded and changed without pressing any key.
- 3) When the procedure is completed, return to the main «MANUAL» page to use the software as usual.

# Chapter 4

## TOOLING

### 4.1 DESCRIPTION OF TOOLING ON THE NC

Tooling is a stage of the preparation of the machine for the execution of a given operation. The following procedure illustrates the steps necessary to tool the NC correctly. Please refer also to the "User Manual" of the machine.

- Choose the set of tools and aggregates to be used with the machine.
- Enter the characteristics of the selected tools and aggregates in the cataloguing tables.
- Enter the type of tool to be mounted on the spindles of boring head, slots and aggregates in the spindle configuration tables.
- Enter the type of tool or aggregate to be mounted in the tool racks of the magazines, for the automatic tool change, in the magazine configuration tables.
- Mount the tools and the aggregates on the spindles and in the tool holders of the magazines.

### 4.2 CATALOGUING TOOLS AND AGGREGATES

The cataloguing operation consists in recording the characteristics of tools and aggregates to be used on the machine.

#### 4.2.1 Boring head tools

- 1) From the «MANUAL» page, select the <Data> menu and the <Drill-b.Data> option.
- 2) Access the «Spindle Tools» table and set the fields as described below:
 

<N>: not accessible. Indicates the number of the tool to be associated with the cataloguing data.

<St>: Activation of the tool.  
Select <S> to activate the tool (<N> if not active).

<L>: overhang of the tool from the nose of the spindle (see icon next to the table).

<D>: diameter of the tool (see icon next to the table).

<Speed>: rotation speed of the tool.

<Type>: type of tool (see icon next to the table).  
Select <Norm> for blind bore, <Lanc> for through boring, <N.I.> for boring with diameter above 14 mm, <Ctsk> for tapered boring.
- 3) To save the data, select the <Save> menu.

## 4.2.2 Tools for slots and aggregates

- 1) From the «MANUAL» page, select the <Data> menu and the <Drill-b. Data> option.
- 2) Access the «Router Tools» table and set the fields as described below:
 

<N>: not accessible. Indicates the number of the tool to be associated with the cataloguing data.

<St>: Activation of the tool.  
Select <S> to activate the tool (<N> if not active).

<L>: overhang of the tool from the nose of the spindle (see icon next to the table).

<D>: diameter of the tool (see icon next to the table).

<S>: length of the cutting edge of the tool (see icon next to the table).

<T>: type of tool (see icon next to the table).  
Select <L> for vertical cuts, <F> for routings and horizontal cuts.

<Name>: name of tool.

<A>: access to the set up of other technical data of the tool (see below).

<Rot.sp.>: rotation speed of the tool.

<Max. sp.>: maximum rotation speed of the tool .

<Min. sp.>: minimum rotation speed of the tool .

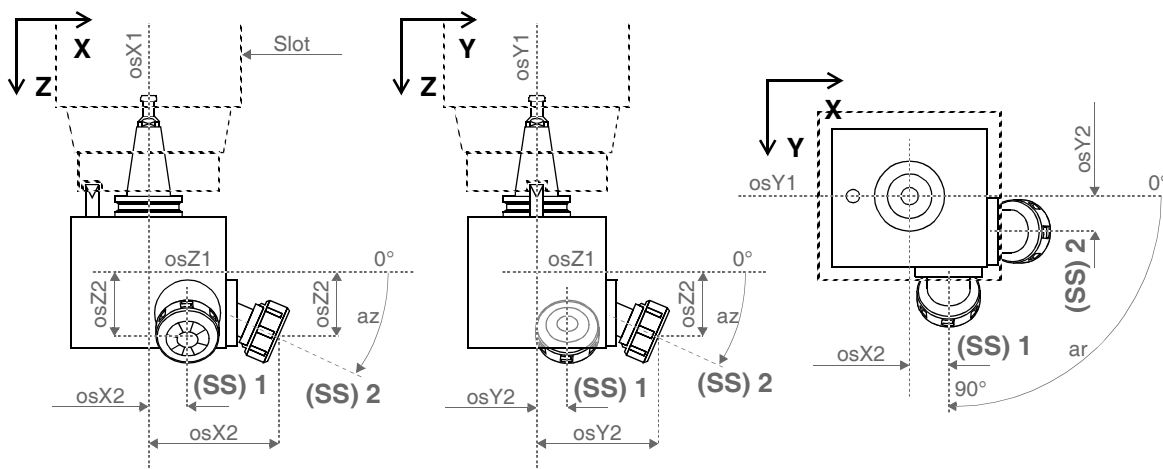
<Acc time>: ramp of acceleration of the tool.

<Dec time>: ramp of deceleration of the tool.

<Rotation>: direction of rotation of the tool.

<Further t.cor>: additional tool radius correction.
- 3) To save the data, select the <Save> menu.

## 4.2.3 Aggregates



- 1) From the «MANUAL» page select the <Data> menu and the <Aggregate> table.
- 2) Access the «Aggregate» table and set the fields as follows .

**<N>**: not accessible. Indicates the number of the aggregate to be associated with the cataloguing data.

**<St>**: Activation of the aggregate.

Select **<S>** to activate the aggregate (**<N>** if not active).

**<Name>**: name of aggregate.

**<X>**: centre of rotation of the aggregate along axis X (osX1) in reference to the axis of the slot. Enter zero (0) if on same axis.

**<Y>**: centre of rotation of the aggregate along axis Y (osY1) in reference to the axis of the slot. Enter zero (0) if on same axis.

**<Z>**: centre of rotation of the aggregate along axis Z (osZ1) in reference to the axis of the slot. Enter zero (0) if on same axis.

**<Type>**: type of operation performed by the aggregate.

Select **<BLADE>** for cuts, **<BOR.>** for borings, and **<ROUT.>** for routings.

**<Sm>**: Access to the set up data of the subspindles of the aggregate.

**<Minimum speed>**: minimum rotation speed of the subspindles of the aggregate.

**<Maximum speed>**: maximum rotation speed of the subspindles of the aggregate.

**<Trans report>**: transmission ratio of the aggregate (e.g. if the ratio is 1:1.5 enter 0.666).

**<N>**: not accessible. Indicates the number of the subspindle (SS) to be associated with the configuration data.

**<St>**: Activation of the subspindle.

Select **<S>** to activate the subspindle (**<N>** if not active).

**<Nome>**: name of tool mounted on subspindle.

**<Rot>**: direction of rotation of the subspindle

**<S>**: symmetrical subspindle. Indicates the subspindle that will be used if the program is launched on the mirror origin. If there is no symmetrical subspindle, enter the subspindle number, corresponding to the line number.

**<Q>**: access to the subspindle configuration data.

**<X>**: centre of rotation of subspindle along axis X (osX2) with reference to the centre of rotation of the aggregate. If on the same axis enter zero (0).

**<Y>**: centre of rotation of subspindle along axis Y (osY2) with reference to the centre of rotation of the aggregate. If on the same axis enter zero (0).

**<Z>**: centre of rotation of subspindle along axis Z (osZ2) with reference to the centre of rotation of the aggregate. If on the same axis enter zero (0).

**<az>**: angle of the axis of rotation of the subspindle with plane X-Y.

**<ar>**: angle of the axis of rotation of the subspindle with axis X, on plane X-Y.

- 3) To save the data, select the **<Save>** menu.

## 4.3 CONFIGURATION OF THE BORING HEAD

Used to define the arrangement of the spindles of the boring head.

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Access the «Sp. tooling» and set up the various fields as described below. If the table is not displayed, select the <Spin> menu.  
  
 <Spnd>: Not accessible. Indicates the number of the boring head spindle to be associated to the configuration data. (See icon near the table. When the cursor is scrolled through the rows, the corresponding spindle is highlighted in red.)  
  
 <Tool nb.>: Number of mounted tool (corresponding to the line number in the «Spindle Tools» table).  
  
 <Sym>: Symmetrical (or mirror) spindle. Indicates the spindle to be used if the program is launched on the mirror origin.  
  
 <Gr>: Number of the relevant spindle group. A group is a set of spindles that can work simultaneously.  
  
 <A>: not accessible. Indicates the spindle configuration characteristics.
- 3) To save the data, select the <Files> menu, the <Spindles> option, and <Save>.
- 4) Enter the name of the configuration in the <File> field (maximum 8 characters).
- 5) Press the ENTER key on the <OK> field to confirm the operation. The file is created and assigned the extension .MND automatically

#### 4.3.1 Changing the active configuration of the boring head

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Select the <Files> menu, the <Spindles> option, and <Open>.
- 3) Select the name of the configuration to enable and press the ENTER key.
- 4) Press the ENTER key on the <OK> field to confirm the operation. The name of the configuration is shown above the menu bar.

#### 4.3.2 Deleting a boring head configuration

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Select the <Files> menu, the <Spindles> option, and <Delete>.
- 3) Select the name of the configuration to delete and press the ENTER key.
- 1) Press the ENTER key on the <OK> field to confirm the operation.

### 4.4 CONFIGURING THE SLOTS

Used to define the arrangement of tools and/or aggregates on the slots.

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Access the «Rout. tooling» table and set up the various fields as described below. If the table is not displayed, select the <Route> menu.  
  
 <Slot>: Not accessible. Indicates the number of the slot to be associated to the configuration data. (See icon near the table. When the cursor is scrolled through the lines, the corresponding slot is highlighted in red.)



**<T. name>**: Name of mounted tool (corresponding to the name indicated in the «Router Tools» table). To use automatic tool change, enter a point (".") on the second line only.

**<Sym>**: Symmetrical (or mirror) tool. Indicates the spindle to be used if the program is launched on the mirror origin. If there are no mirror spindles, enter its own number, corresponding to the number of the line.

**<Gr>**: Number of the relevant slot group. A group is a set of slots that can work simultaneously.

**<A>**: not accessible. Indicates the slot configuration characteristics.

- 3) To save the data, select the <Files> menu, the <Routers> option, and <Save>.
- 4) Enter the name of the configuration in the <File> field (maximum 8 characters).
- 5) Press the ENTER key on the <OK> field to confirm the operation. The file is created and assigned the extension .PNT automatically

#### 4.4.1 Changing the active configuration of the slot

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Select the <Files> menu, the <Routers> option, and <Open>.
- 3) Select the name of the configuration to be enabled and press the ENTER key.
- 4) Press the ENTER key on the <OK> field to confirm the operation. The name of the configuration is shown above the menu bar.

#### 4.4.2 Deleting a slot configuration

- 1) From the «MANUAL» page select the <Data> menu and the <Tooling> option.
- 2) Select the <Files> menu, the <Routers> option, and <Delete>.
- 3) Select the name of the configuration to be deleted and press the ENTER key.
- 4) Press the ENTER key on the <OK> field to confirm the operation.

### 4.5 CONFIGURATION OF THE TOOL MAGAZINES

Aggregates and tools to be used only for manual tool change must not be included in the configuration of the magazine.

- 1) From the «MANUAL» page select the <Data> menu and the <Magazines> option.
- 2) In the <Number> field, enter the number of the magazine to configure (e.g.: 2, for the magazine on the carriage).
- 3) Access the «Magazine Data» table and set up the fields as indicated below.

**<N>**: not accessible. Indicates the number of the tool holder to be associated with the configuration data.

**<A>**: Activation of the tool holder.

Select <S> to activate the tool holder (<N> if not active).

**<Tool name>**: name of tool or aggregate to be mounted in the tool holder.

<P>: presence of the tool or aggregate in the tool holder.  
Select <P> if present, <-> not present.

<Q>: **access permitted to the user only for reading the data.**

Do not change the values set by BIESSE, to prevent problems during automatic tool change.

<Force>: forced opening and positioning of the tool holder.

Select <ON> to start the operation, <OFF> to de-activate the operation.

- 4) To save the data, select the <Save> menu.

# Chapter 5

## BASIC PROGRAMMING

### 5.1 BASIC PROGRAMMING - DESCRIPTION

The expression “basic programming” refers to the creation of a computer file, called “program”, containing all the information necessary to perform the required machining operation. To better organise the work of the machine, another file, called “Work List”, may be created. A “Work List” is a list of all the names of the programs to be executed with the amount of panels to be machined for each one.

### 5.2 PROGRAMMABLE OPERATIONS

The machining operations that may be programmed are borings, routings, and cuts, either vertical or horizontal in relation to the panel laying on the work table.

#### 5.2.1 Programmable borings

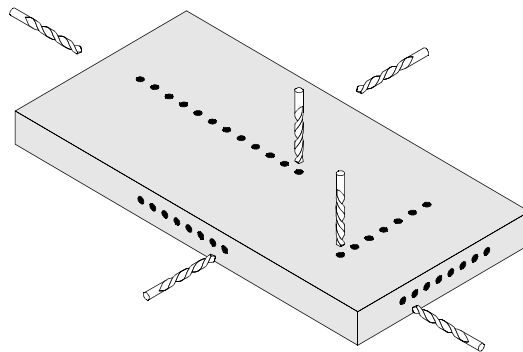
Two types of borings may be programmed: “optimised” or “non optimised” borings.

“Optimised” borings may be executed only by the spindles of the boring head. In this type of programming, the operator sets the boring information (diameter, bit type, etc.), which is then used by the NC to search automatically the most suitable tools in the configuration of the boring head. To optimise the machining times, the NC will then select, among the spindles with the most suitable tools, which tools to use and their best work path.

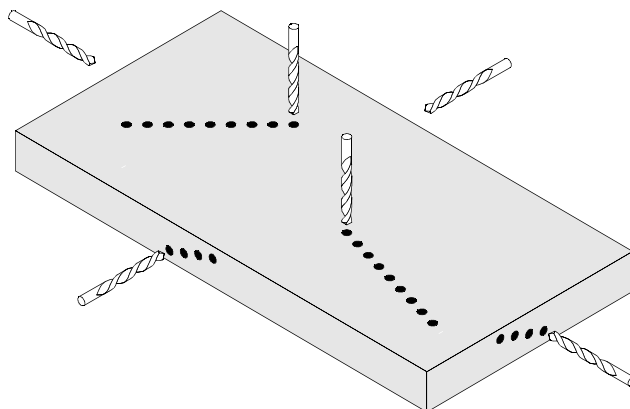
“Non optimised” borings may be executed with the spindles of the boring head, with suitable aggregates, and, if necessary, with slot 2. In this type of programming, the operator sets the boring information and selects which spindles, aggregates or slot to use in the machining.

The various types of borings are illustrated below.

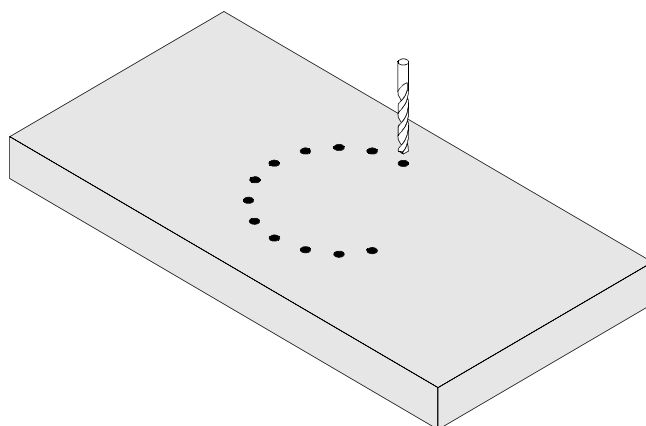
- Vertical and horizontal boring on straight line. Executed with the tools of the boring head spindles or with the tool of slot 2.



- Vertical and horizontal boring on angled line. Executed with the tools of boring head spindles or with the tool of slot 2.

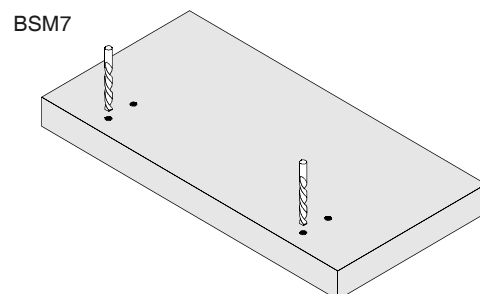
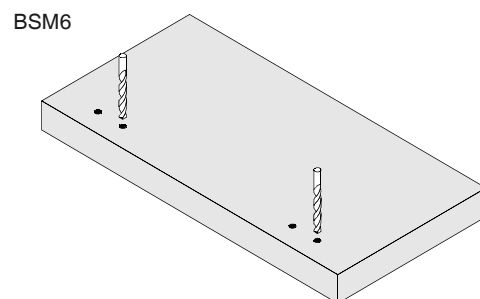
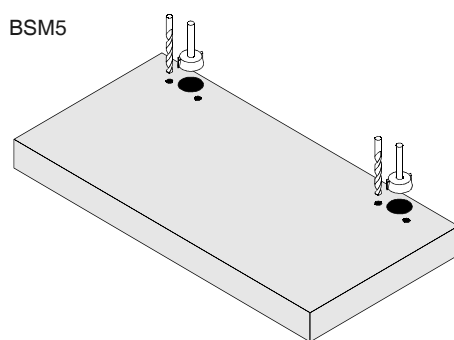
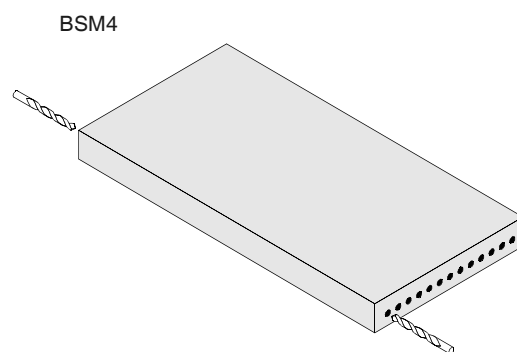
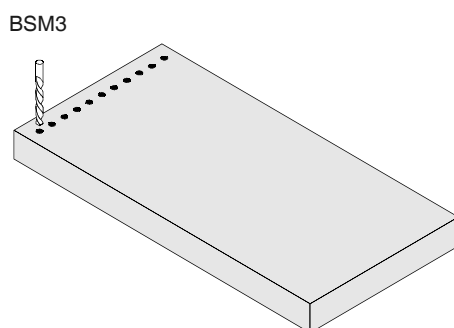
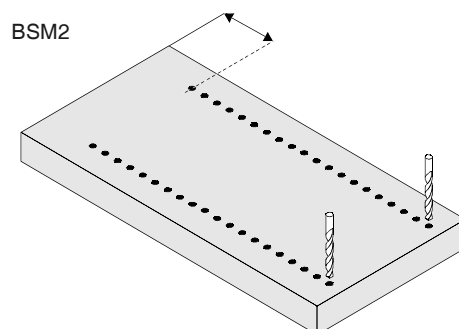
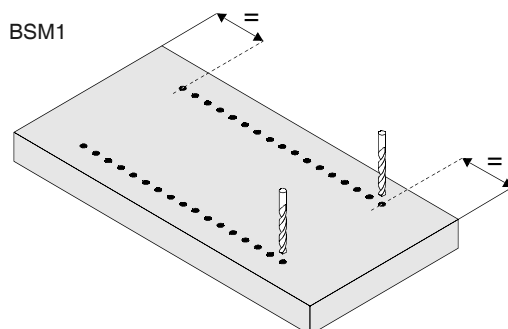


- Vertical boring on circle. Executed with tools of the boring head spindles or with the tool of slot 2.



- Macro-directed vertical and horizontal boring. Executed with the tools of the boring head spindle. Ten macros are available:  
 Macro BSM1. Executes a vertical system 32 boring centred on the panel.  
 Macro BSM2. Executes a vertical system 32 boring from a fixed initial value.  
 Macro BSM3. Executes a vertical boring for assembly .  
 Macro BSM4. Executes a horizontal boring for assembly.  
 Macro BSM5. Executes a vertical boring for hinges.  
 Macro BSM6. Executes a vertical boring for cross-shaped mounting plates.

Macro BSM7. Executes a vertical boring for straight mounting plates.  
 Macros BSM8, BSM9, BSM10 are empty and available to the operator..

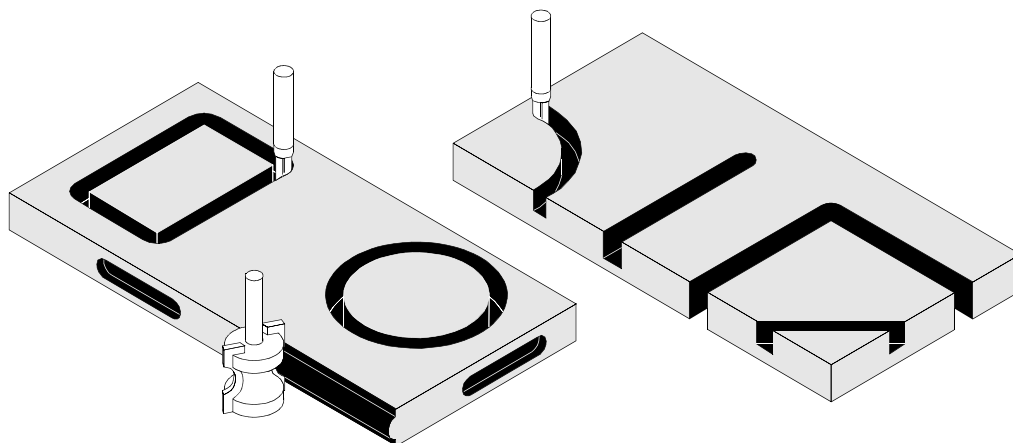


### 5.2.2 Programmable routing

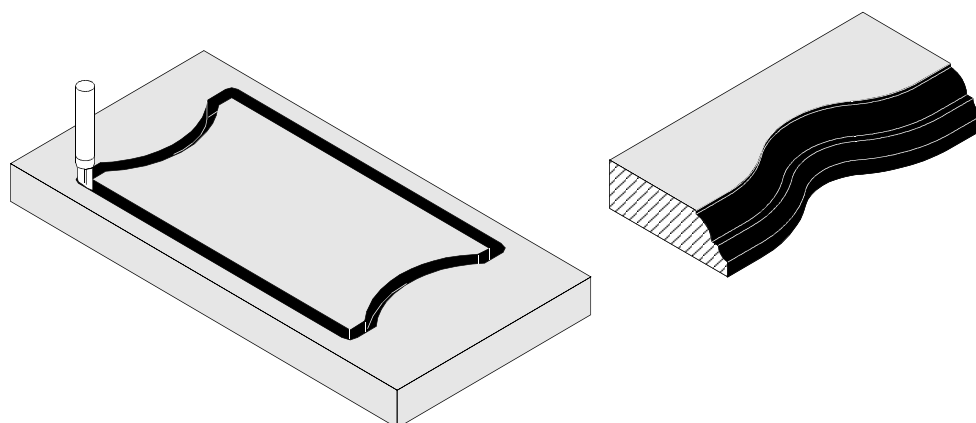
Routing is programmed using macros and executed with the tool or aggregate mounted on slot 2.

Below are examples of the various types of routing.

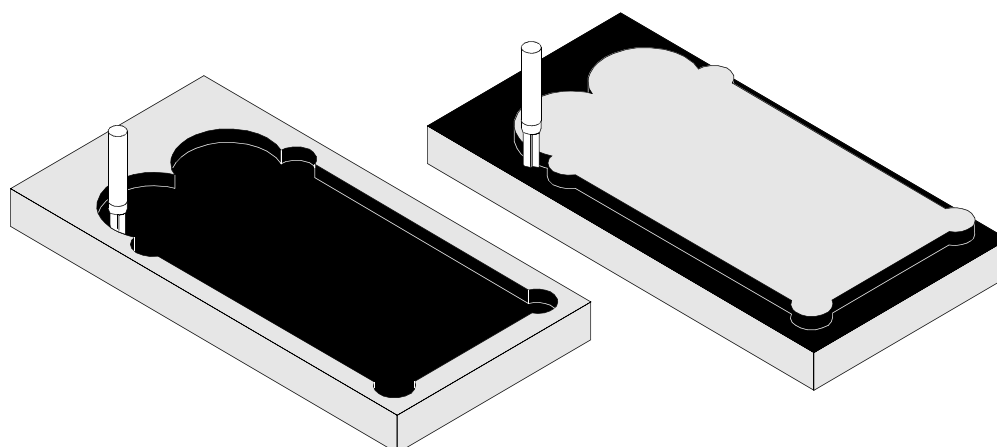
- Routing of geometrical elements.



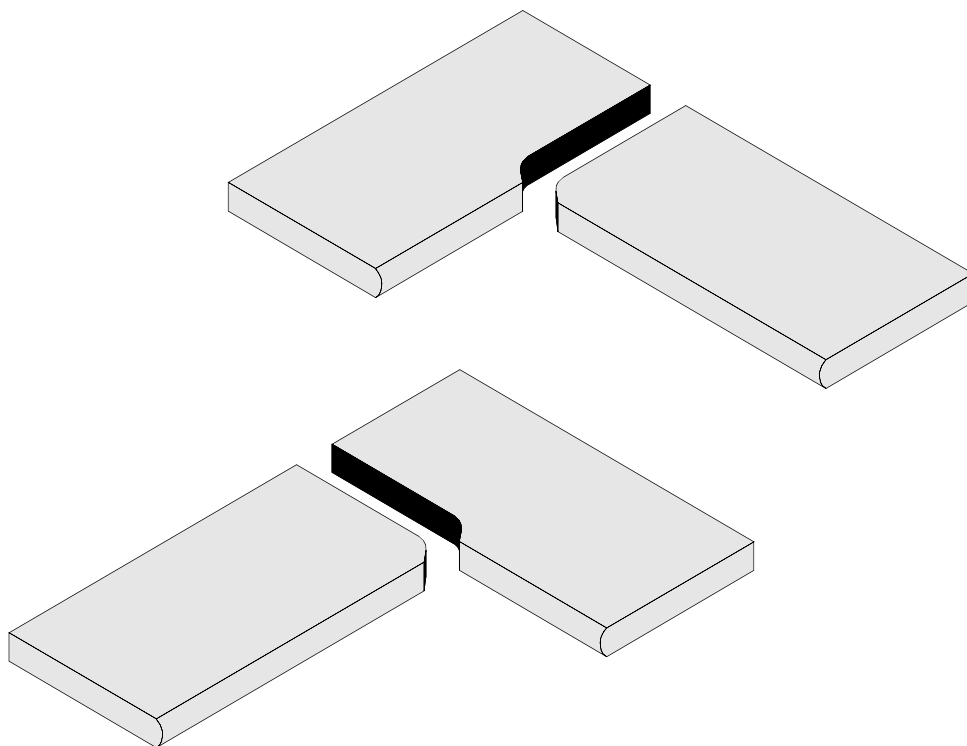
- Routing of BIESSE-configured cabinet door patterns..



- Routing of CAD profiles..

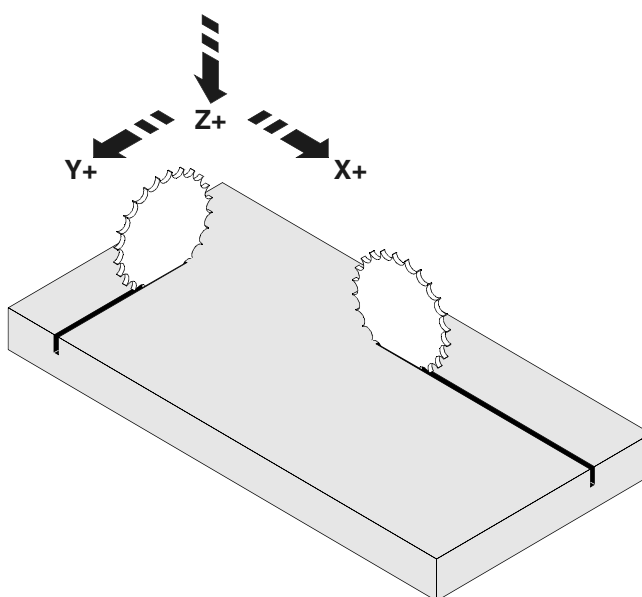


- Routing for assembling cabinet tops at 90°..



### 5.2.3 Programmable cuts

Cuts may be programmed in the direction of axis X or in the direction of axis Y. Cuts are executed with slot 1..



### 5.3 CREATING THE PROGRAM

A program is a set of instructions necessary for the machining of the panel.

- 1) From the «MANUAL» page, select the <Edit> menu and the <Programs> option.
- 2) Access to the fields of the page and set up the data as described below.

<Panelame>: name of the program (maximum 8 characters).

<Tooling>: In the field to the right, name of the tooling configuration of the boring head spindles, in the field to the left, name of the tooling configuration of the slot.

<Clamp>: Has the same purpose of the CLAMP STOP SELECTION function key, and associates it to the program.

<Origin>: Has the same purpose of the FRONT STOP SELECTION Function key, and associates it to the program.

<Length>: Size of the panel in the direction of axis X.

<Width>: Size of the panel in the direction of axis Y.

<Thickn>: Size of the panel in the direction of axis Z.

<X of sosp.>: Automatic panel machining stop position in the direction of axis X.

- 3) To save the data, select the <Files> menu and the <Save> option. If you select the <Save + Open> option, the program will be saved and opened automatically in the «AUTOMATIC\PROGRAM» page to be executed.
- 4) If you want to retain the previous name, press the ENTER key on the <OK> field, otherwise enter the name of the program in the <File> field (maximum 8 characters).
- 5) Press the ENTER key on the <OK> field to confirm the operation and a file with the extension \*.PAN will be automatically created.

### 5.4 OPENING, CHANGING AND SAVING A PROGRAM

- 1) From the «MANUAL» page, select the <Edit> menu and the <Programs> option.
- 2) Select the <Files> menu and the <Open> option.
- 3) Select the name of the program to open and press the ENTER key.
- 4) Press the ENTER key on the <OK> field to confirm the operation.
- 5) Select the <Edit F> menu to change the programming of optimised borings, or the <Edit A> menu to change the programming of non-optimised borings, cuts or routings.
- 6) Move the cursor to the program line to change and press the ENTER key.
- 7) Change the data as required.

#### Deleting a program line

Move the cursor to the line to be deleted and select the <Del> menu. Press the ENTER key on <Yes> to confirm the deletion, or on <No> to cancel the operation.



### Copying a program line

Move the cursor to the line to be copied and select the <Copy> menu. Select the <Copy over> option to copy the line and place it above the selected line, or the <Copy under> option to copy the line and place it under the selected line.

### Moving a program line

Move the cursor to the line to be moved and select the <Copy> menu. Select the <Move over> option to move the line one line above, or the <Move under> option to move the line one line below.

- 8) When all changes are complete, save the program. Access the «MANUAL» page, select the <Edit> menu and the <Programs> option.
- 9) To save the data, select the <Files> menu and the <Save> option. If you select the <Save+Open> option, the program will be saved and opened automatically in the «AUTOMATIC\PROGRAM» page to be executed.
- 10) If you want to retain the previous name, press the ENTER key on the <OK> field, otherwise enter the name of the program in the <File> field (maximum 8 characters).
- 11) Press the ENTER key on the <OK> field to confirm the operation and a file with the extension \*.PAN will be automatically created.

## 5.5 PARAMETER-GUIDED ADJUSTMENT OF THE PROGRAM

The expression “parameter-guided adjustment of the program” indicates the automatic adaption of the programmed machining to match the changed dimensions of the panel. To implement parameter-guided adjustment in a program, you first create parameters associated to values such as for instance the development of an expression, and then apply these parameters to the programming. To better understand the concept behind the parameter-guided adjustment of machining program, and how you can apply it to your own work, please refer to “PROGRAMMING OPTIMISED BORINGS USING MACROS” (page 5-12).

The parameters are created in a specific table which is accessible from the pages «EDITOR/OPTIMISED BORINGS» or «EDITOR/ASSISTED», by pressing the ARROW key and selecting the <Param> menu. The Parameters Table of each program contains as default all the main parameters relative to the dimensions of the panel (X = Length, Y = Width, Z = Thickness). Each section of the table contains a single parameter and consists of two fields: At the left you write the name, and at the right the value or an expression. Parameters having an expression in their value field must be written after the parameters having a fixed numerical value to allow the NC to calculate the value of the expression without interpretation errors.

### Entering expressions

Besides the normal alphanumeric characters, the expression parser of the NC can also accept the following calculation operators:

- %(x) = calculation of the integer part of the value “x”;
- \$(x) = calculation of the sine of “x”;
- @(x) = calculation of the cosine of “x”;
- ^(x) = calculation of the square root of “x”.

## 5.6 DELETING A PROGRAM

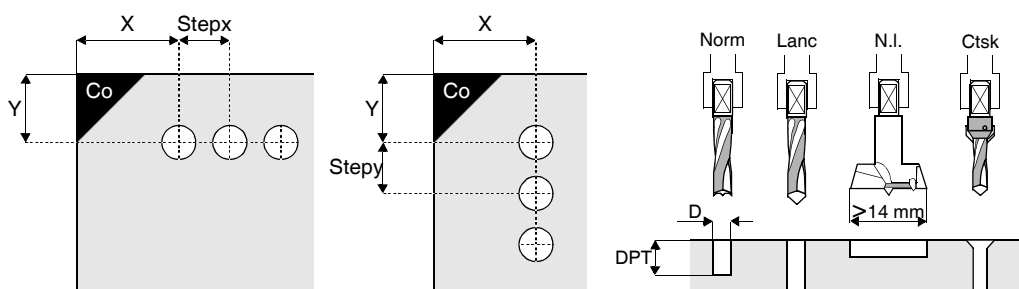
- 1) From the «EDITOR\PROGRAM DATA», select the <Files> menu and the <Delete> option to delete a specific program, or the <Delete all> option to delete all the program stored in the memory of the NC.
- 2) Select the name of the program to delete and press the ENTER key on the <OK> field to confirm the operation. Press the ESC key to cancel.

## 5.7 PROGRAMMING OPTIMISED BORING OPERATIONS

The options available in this type of programming are described below:

### 5.7.1 Optimised vertical boring on straight line

- 1) From the «EDITOR\OPTIMISED BORINGS» page, select the <Holes> menu and the <Foro Vert M>; the name is displayed under the last row of icons of the open popup.
- 2) Press the ENTER key to set up the fields as indicated below.
  - <Sp>: number of the reference corner, for the initial boring co-ordinates.
  - <X>: initial co-ordinate of the boring along axis X.
  - <Y>: initial co-ordinate of the boring along axis Y.
  - <PRF>: depth of boring.
  - <D>: diameter of boring.
  - <Rip>: repetition of the boring.
  - <Tool>: type of tool.
    - Select <norm> for blind boring, <lanc> for through boring, <N.I.> for boring with diameter above 14 mm, <Ctsk> for tapered boring.
  - <Type>: type of repetition of the boring.
    - Select <-> to repeat on a straight line.
  - <Repeat>: total number of borings to execute during the repetition.
  - <Stepx>: centre distance between each boring to be executed along axis X, during the repetition.
  - <Stepy>: centre distance between each boring to be executed along axis Y, during the repetition.
- 3) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.7.2 Optimised vertical boring on angled line

- 1) From the «EDITOR\OPTIMISED BORINGS» page, select the <Borings> menu and the <Foro Vert.M> command; the name is displayed under the last row of icons of the open popup.
- 2) Press the ENTER key to set up the fields as indicated below.
 

<Sp>: number of the reference corner, for the initial co-ordinates of the boring operation and the angle of the line for the repetition of the boring.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<PRF>: depth of boring.

<D>: diameter of boring.

<Rip>: boring repetition set-up.

<Tool>: type of tool.

Select <Norm> for blind boring, <Lanc> for through boring, <N.I.> for boring with diameter Above 14 mm, <Ctsk> for tapered boring.

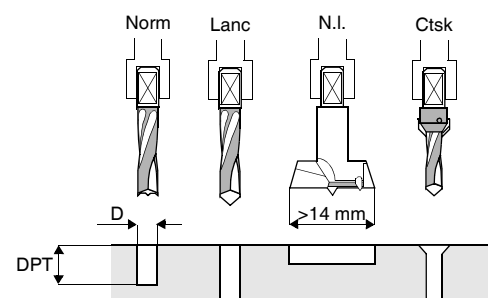
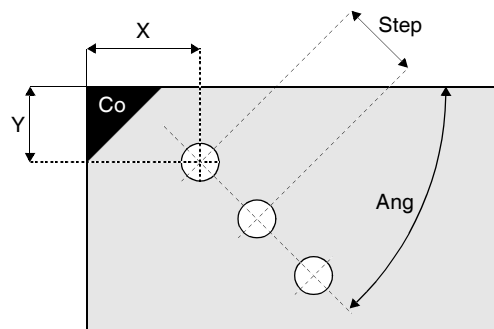
<Type>: type of repetition.

Select <\> to repeat along an angled line.

<Repeat>: total number of borings to execute during the repetition.

<Step>: centre distance between each boring to be executed along the angled line, during the repetition.

<Angle>: angle of the line, from the side of the panel which is common with the direction of axis X.
- 3) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.7.3 Optimised vertical boring on a circle

- 1) From the «EDITOR\OPTIMISED BORINGS» page, select the <Holes> menu and the <Foro Vert. M> command; the name is displayed under the last row of icons of the open popup.

- 2) Press the ENTER key to set up the fields as indicated below.

<Sp>: number of the reference corner, for the initial co-ordinates of the boring and the circle for the repetition of the boring.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<PRF>: depth of boring.

<D>: diameter of boring.

<Rip>: boring repetition set-up.

<Tool>: type of tool.

Select <Norm> for blind boring, <Lanc> for through boring, <N.I.> for boring with diameter above 14 mm, <Ctsk.> for tapered boring.

<Type>: type of repetition.

Select <0> to repeat on a circle.

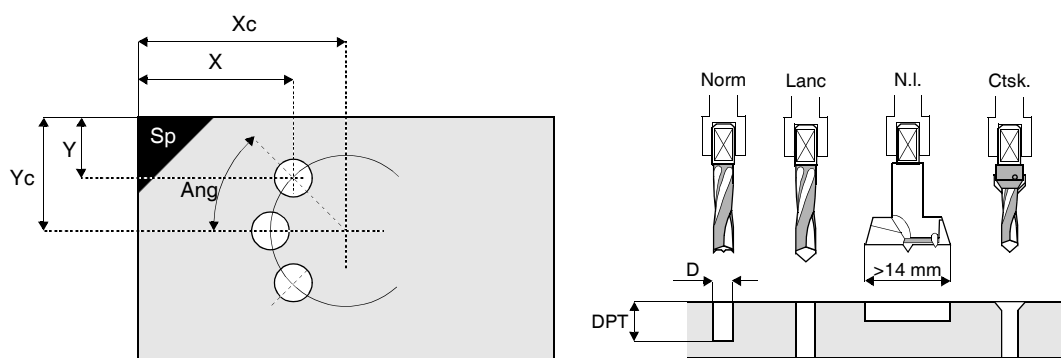
<Repeat>: total number of borings to execute during the repetition.

<Xc>: co-ordinate of the centre of the circumference along axis X.

<Yc>: co-ordinate of the centre of the circumference along axis Y.

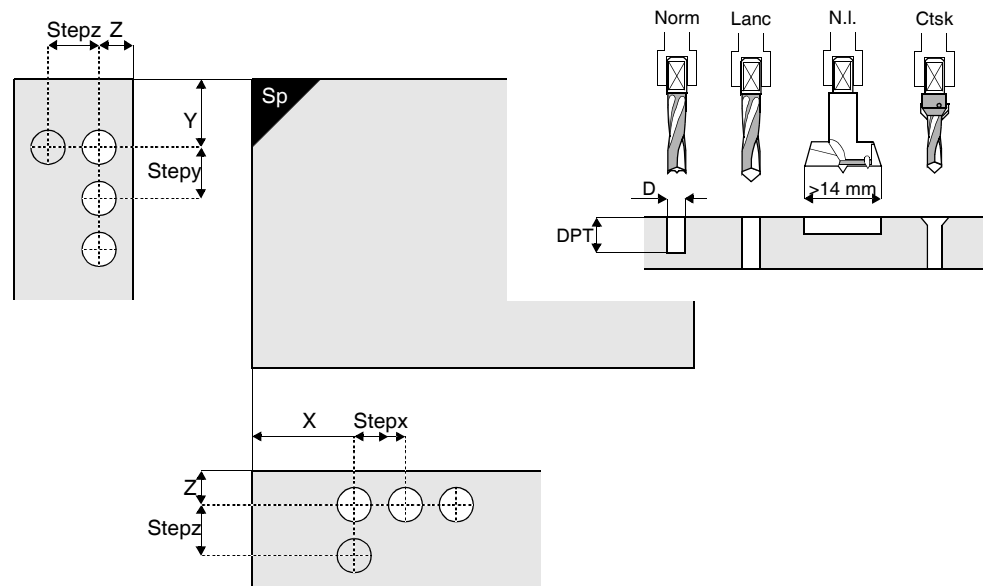
<Angle>: angle of the centre distances between each boring to be executed along the circumference, during the repetition.

- 3) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.7.4 Optimised horizontal boring on straight line

- 1) From the «EDITOR\OPTIMISED BORINGS» page, select the <Holes> menu and the <Foro Oriz M> command; the name is displayed under the last row of icons of the open popup.
- 2) Press the ENTER key to set up the fields as indicated below.
  - <L>: number of the side on which the boring is to be executed.
  - <Sp>: number of the reference corner, for the initial co-ordinates of the boring.
  - <X>: initial co-ordinate of the boring along axis X.
  - <Y>: initial co-ordinate of the boring along axis Y.
  - <Z>: initial co-ordinate of the boring along axis Z.
  - <PRF>: depth of boring.
  - <D>: diameter of boring.
  - <Rip>: boring repetition set-up.
  - <Tool>: type of tool.
    - Select <Norm> for blind boring, <Lanc> for through boring, <N.I.> for boring with diameter above 14 mm, <Ctsk> for tapered boring.
  - <Repeat>: total number of borings to execute during the repetition.
  - <Stepx>: centre distance between each boring to be executed along axis X, during the repetition.
  - <Stepy>: centre distance between each boring to be executed along axis Y, during the repetition.
  - <Stepz>: centre distance between each boring to be executed along axis Z, during the repetition.
- 3) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



## 5.8 PROGRAMMING OPTIMISED BORINGS USING MACROS

Macros are parametric subprograms that may be used during programming. Ten macros are available, 7 of which have been defined already by BIESSE, and 3 are available to the operator.

Macros are created like the programs and have the same extension (\*.PAN), but must be saved with the prefix "BSM" before the identification number (e.g. BSM8) to allow the NC to recognise them as macro. Since they are essentially programs, they can be opened, changed, parameterised and saved as such.

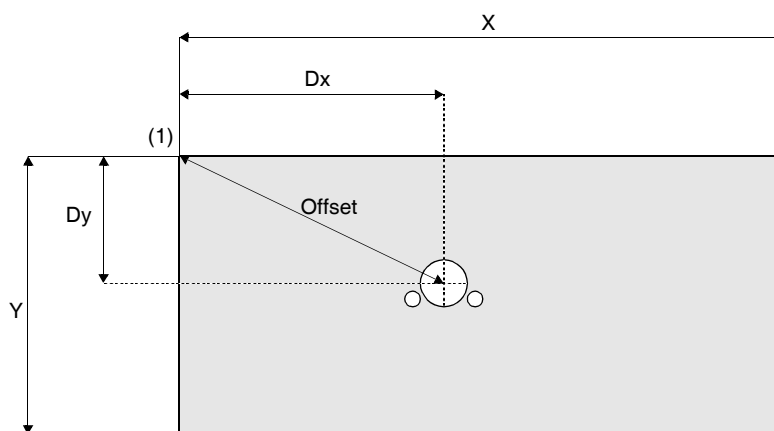
### 5.8.1 Accessing the parameters of the macros for changing the values

More information on the creation of parameters may be found in the paragraph "PARAMETER-GUIDED ADJUSTMENT OF THE PROGRAM" (page 5-7).

- 1) From the «EDITOR\PROGRAM DATA» page open the macro as a program and select the <Edit F> menu.
- 2) Press the ARROW key, select the <Param> menu and press the ENTER key to gain access to the parameters. To determine which parameters may be modified, refer to the description of the selected macro.
- 3) When the change has been completed, press twice the ESC key and save the macro as a program, retaining the original name.

### 5.8.2 Using macros for optimised boring operations

- 1) From the «EDITOR\PROGRAM DATA» page select first the <Edit F> menu and then the <Holes> menu.
- 2) Select the macro to use in the program among the 10 macros listed in the pop-up (the name <Macro file BSM> is displayed under the last row of icons) and press the ENTER key. Automatically, the NC will open a popup where you can enter the offset of the macro, that is the reference for the application in the program. To determine the offset, please refer to the description of the selected macro.
- 3) Press the ENTER key on the <OK> field to confirm the use of the macro, and then save the program. Press the ESC key to cancel.



### 5.8.3 Macro BSM1: Executes a vertical system 32 boring centred on the panel

Executes two vertical rows of borings, for the insertion of shelf supports. The number of borings to be executed is calculated automatically and placed at the centre of the panel in the direction of axis X.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

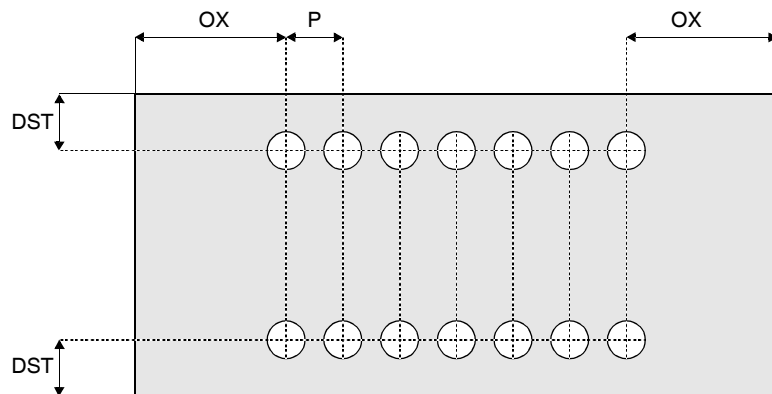
<Dx>: fixed to 0 (zero)  
 <Dy>: fixed to 0 (zero)  
 <Edge>: fixed to 1

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

OX	100
P	32
REP	$\% ((X - 2 * OX) / P) + 1$
RES	$(X - OX * 2) - P * (REP - 1)$
DST	$Y / 8$

The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<PRF>: boring depth  
 <D>: boring diameter

#### 5.8.4 Macro BSM2: Executes a vertical system 32 boring from a fixed initial value

Executes two vertical rows of borings, for the insertion of shelf supports. The number of borings to be executed is calculated automatically, and placed at a specific initial value in the direction of axis X, with reference to the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

##### Macro application offset

<Dx>: fixed to 0 (zero)

<Dy>: fixed to 0 (zero)

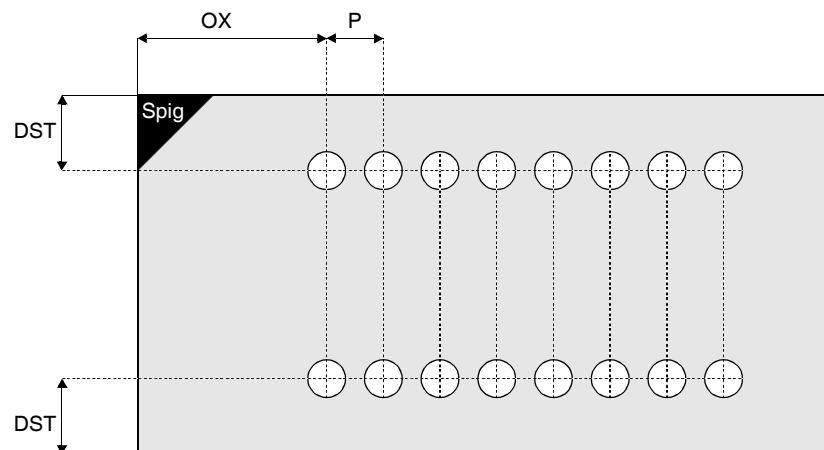
<Edge>: variable

##### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

OX	100
P	32
REP	$\% (X - 2 * OX) / P + 1$
RES	$(X - OX * 2) - P * (REP - 1)$
DST	Y / 8

The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner

<PRF>: boring depth

<D>: boring diameter



### 5.8.5 Macro BSM3: Executes a vertical boring for assembly

Allows the execution of two vertical rows of borings used to assemble the panel with other panels. The number of borings to be executed is calculated automatically, and placed at a specific initial value in the direction of axis Y, with reference to the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

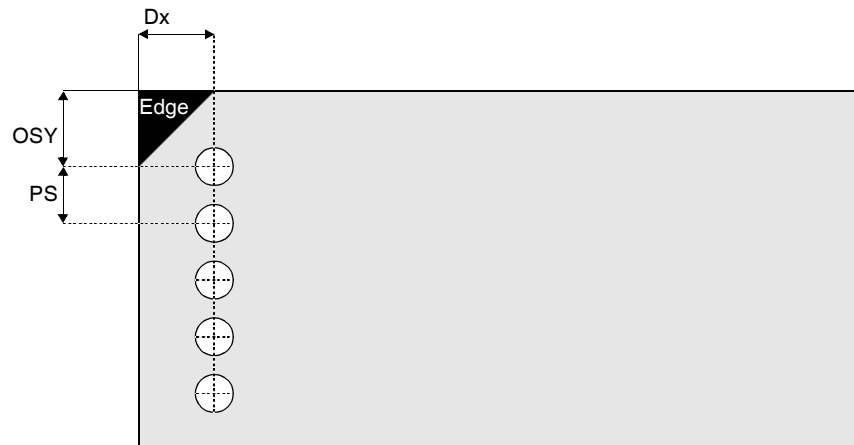
<Dx>: variable  
 <Dy>: fixed to 0 (zero)  
 <Edge>: variable

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

OSY	30
PS	64
RIPS	$\% ((Y - 2 * OSY) / PS) + 1$
RESS	$(Y - OSY * 2) - PS * (RIPS - 1)$

The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner  
 <PRF>: boring depth  
 <D>: boring diameter

### 5.8.6 Macro BSM4: Executes a horizontal boring for assembly

Allows the execution of one vertical row of borings used to assemble the panel with other panels. The number of borings to be executed is calculated automatically, and placed on the selected side beginning at the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

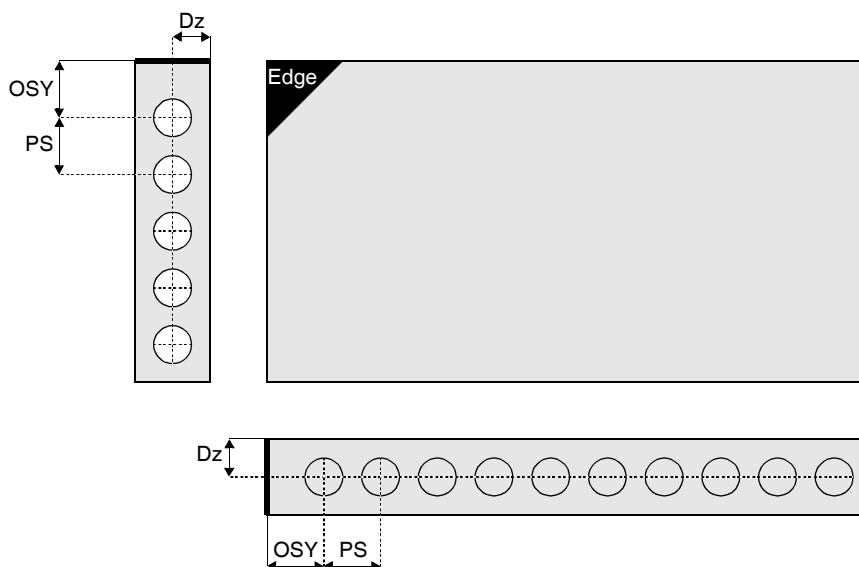
<Dx>: fixed to 0 (zero)  
 <Dy>: fixed to 0 (zero)  
 <Dz>: variable (to set at the centre of the thickness, enter  $Z/2$ )  
 <Side>: variable  
 <Edge>: variable based on the side

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

OSY	30
PS	64
RIPS	$\% ((Y - 2 * OSY) / PS) + 1$
RESS	$(Y - OSY * 2) - PS * (RIPS - 1)$

The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner  
 <PRF>: boring depth  
 <D>: boring diameter

### 5.8.7 Macro BSM5: Executes a vertical boring for hinges

Allows the execution of a vertical boring used to place a hinge on the panel. The boring is set automatically along axis X starting at the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

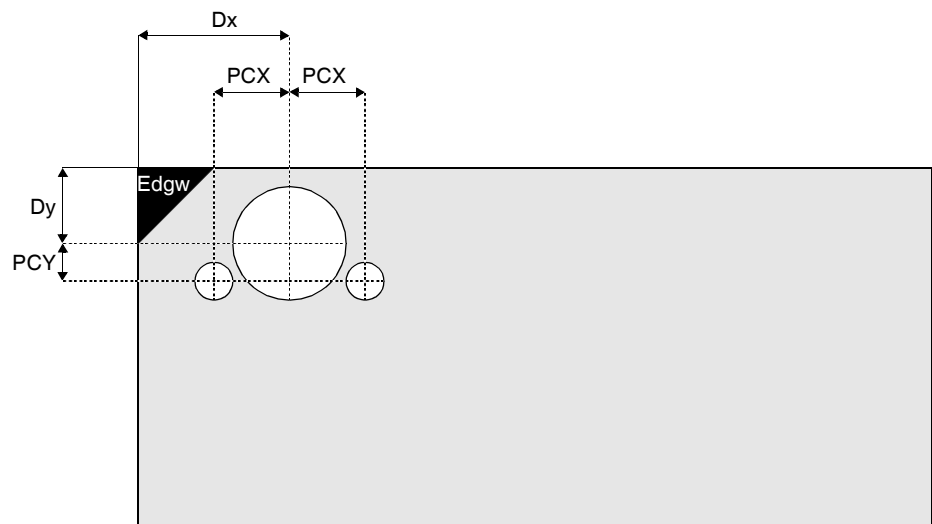
<Dx>: variable  
<Dy>: variable  
<Edge>: variable

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

PCX	25
PCY	10

The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner  
<PRF>: boring depth  
<D>: boring diameter

### 5.8.8 Macro BSM6: Executes a vertical boring for cross-shaped mounting plates

Allows the execution of a vertical boring used to place a cross-shaped mounting plate on the panel. The boring is set automatically along axis X starting at the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

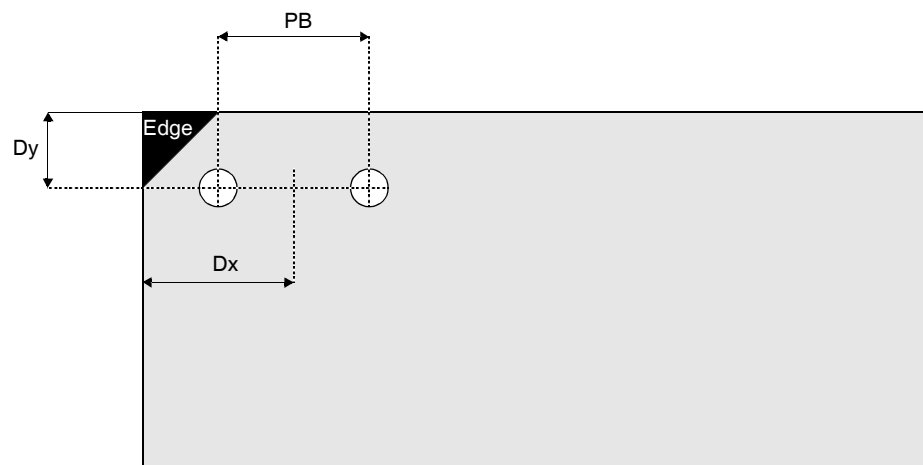
<Dx>: variable  
<Dy>: variable  
<Edge>: variable

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

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The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner  
<PRF>: boring depth  
<D>: boring diameter

### 5.8.9 Macro BSM7: Executes a vertical boring for straight mounting plates

Allows the execution of a vertical boring used to place a straight mounting plate on the panel. The boring is set automatically along axis X starting at the selected corner.

Below are the values of the application offset of the macro, the parameters, and the programming configuration. The values described as “fixed” may not be changed. The values described as “variable” may be changed by the operator as required.

#### Macro application offset

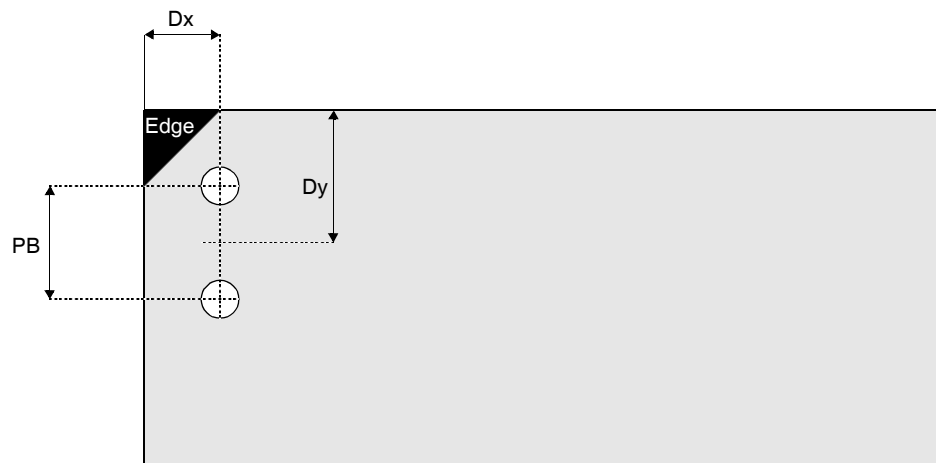
<Dx>: variable  
<Dy>: variable  
<Edge>: variable

#### Programming the macro

The parameters used for the parameterisation of the macro are indicated below (name to the left and value to the right).

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The parameters that may be changed are indicated in the figure below.



In addition, the following fields may be changed by pressing the ENTER key on the programming lines.

<Sp>: number of the reference corner  
<PRF>: boring depth  
<D>: boring diameter

## 5.9 PROGRAMMING NON-OPTIMISED BORING

The options available in this type of programming are described below:

### 5.9.1 Non-optimised vertical boring using the boring head

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Vert.Bor.Sp.> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.

<X>: initial co-ordinate of the boring along axis X, referred to the first spindle entered in field <T>.

<Y>: initial co-ordinate of the boring along axis Y, referred to the first spindle entered in field <T>.

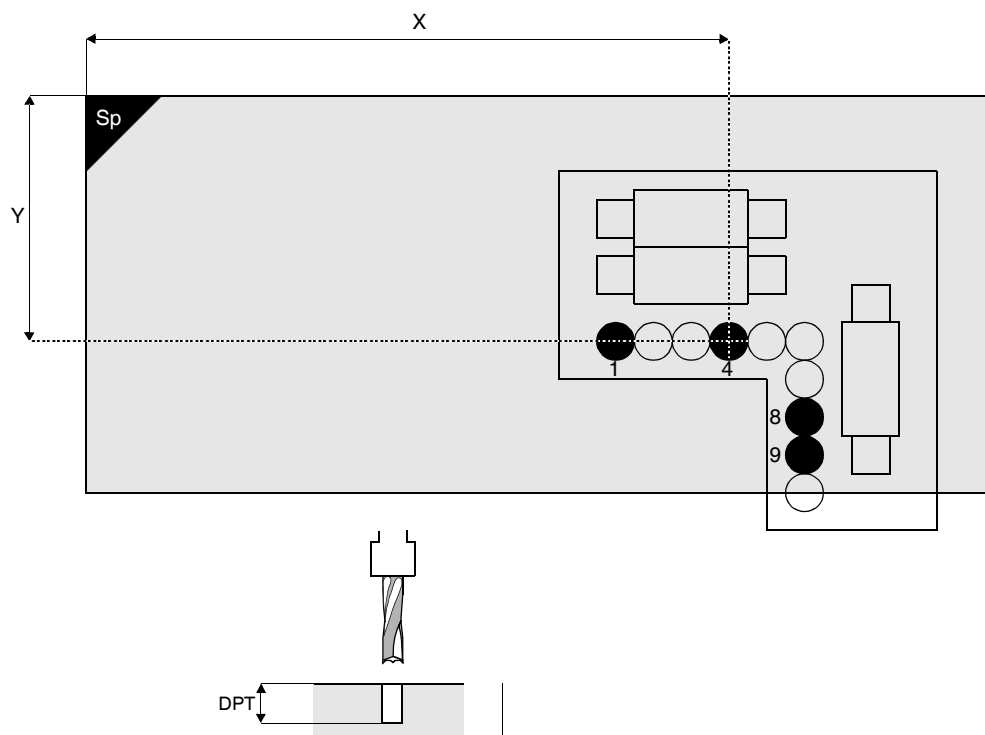
<PRF>: depth of boring, referred to the first spindle entered in field <T>. It is recommended that tools with the same overhang be used on the relevant spindles to prevent possible damages caused by an excessive boring depth.

<VEL>: rotation speed of the spindles.

<T>: number of the spindle to be used for the boring. If you want to use more than one spindle at the same time, enter a "." (point) between each spindle number (e.g., to use spindles 4, 1, 8 and 9 enter 4.1.8.9).

<Head>: for displaying the numbering of the spindles.

- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



## 5.9.2 Non-optimised vertical boring on straight line with slot 2

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Ver.Bor.Bit> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<Z>: not used.

<CAM>: access to the set-up of other data.

In the upper section of the pop-up opened with the <CAM> field, press the ENTER key to select the tool to be used for boring.

<Depth>: boring depth.

<Interp.Speed>: not used.

<Entry speed>: entry speed of tool into panel.

<Rotation speed>: rotation speed of the tool.

<No. Steps>: number of entries of tool into panel (zero corresponds to 1).

<Rep>: boring repetition set-up.

<Type>: type of repetition.

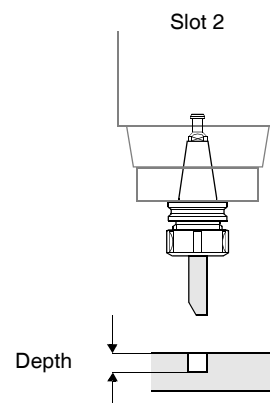
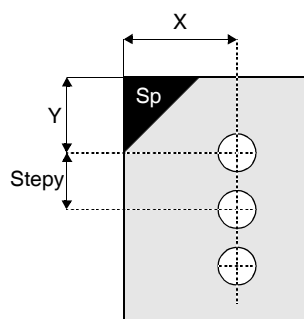
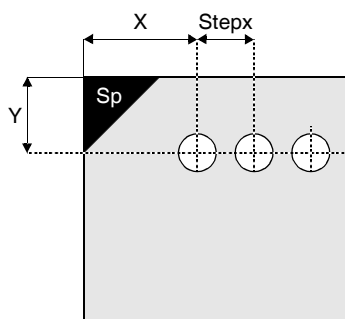
Select <-> to repeat on a straight line.

<Repeat>: total number of borings to execute during the boring repetition.

<Stepx>: centre distance between each boring to be executed along axis X, during the repetition.

<Stepy>: centre distance between each boring to be executed along axis Y, during the repetition.

- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.9.3 Non-optimised vertical boring on angled line with slot 2

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Ver.Bor.Bit> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<Z>: not used.

<CAM>: access to the set-up of other data.

In the upper section of the pop-up opened with the <CAM> field, press the ENTER key to select the tool to be used for boring.

<Depth>: boring depth.

<Interp. Speed>: not used.

<Entry speed>: entry speed of tool into panel.

<Rotation speed>: rotation speed of the tool.

<No.Steps>: number of entries of tool into panel (zero corresponds to 1).

<Rep>: boring repetition set-up.

<Type>: type of repetition.

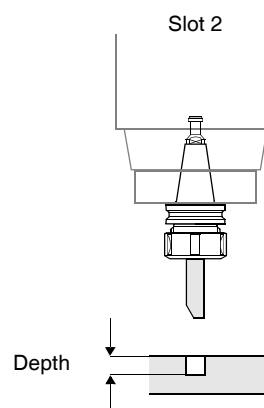
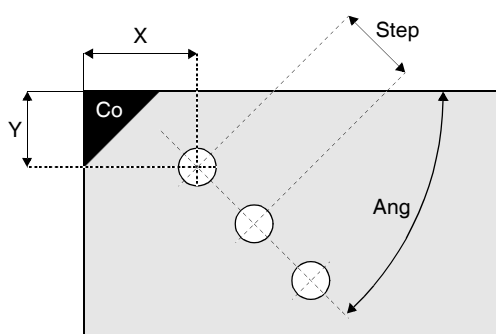
Select <\> to repeat on an angled line.

<Repeat>: total number of borings to execute during the repetition.

<Step>: centre distance between each boring to be executed along the angled line, during the repetition.

<Angle>: angle of the line, from the side of the panel which is common with the direction of axis X.

- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.





### 5.9.4 Non-optimised vertical boring on a circle with slot 2

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Ver.Bor.Bit> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<Z>: not used.

<CAM>: access to the set-up of other data.

In the upper section of the pop-up opened with the <CAM> field, press the ENTER key to select the tool to be used for boring.

<Depth>: boring depth.

<Interpolation Sp>: not used.

<Entry speed>: entry speed of tool into panel.

<Rotation speed>: rotation speed of the tool.

<No.Steps>: number of entries of tool into panel (zero corresponds to 1).

<Rip>: boring repetition set-up.

<Type>: type of repetition.

Select <0> to repeat on a circle.

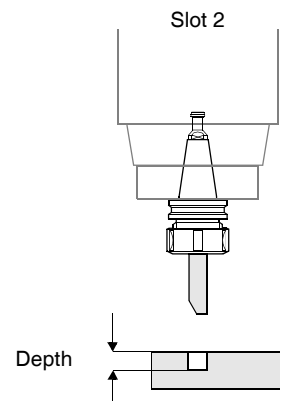
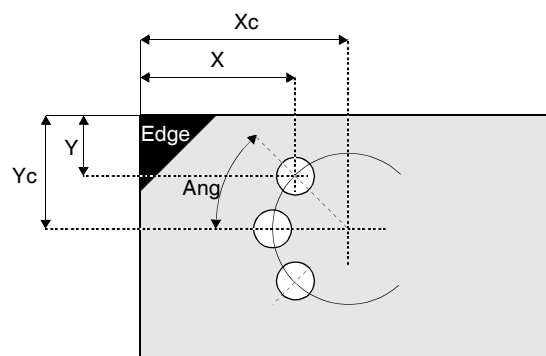
<Repeat>: total number of borings to execute during the repetition.

<Xc>: co-ordinate of the centre of the circumference along axis X.

<Yc>: co-ordinate of the centre of the circumference along axis Y.

<Angle>: angle of centre distance between each boring to be executed along the circumference, during the repetition.

- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.9.5 Non-optimised horizontal boring using the boring head

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Hor.Bor.Sp.> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.
 

<L>: number of side on which the boring is to be executed.

<X>: initial co-ordinate of the boring along axis X, referred to the first spindle entered in field <T>.

<Y>: initial co-ordinate of the boring along axis Y, referred to the first spindle entered in field <T>.

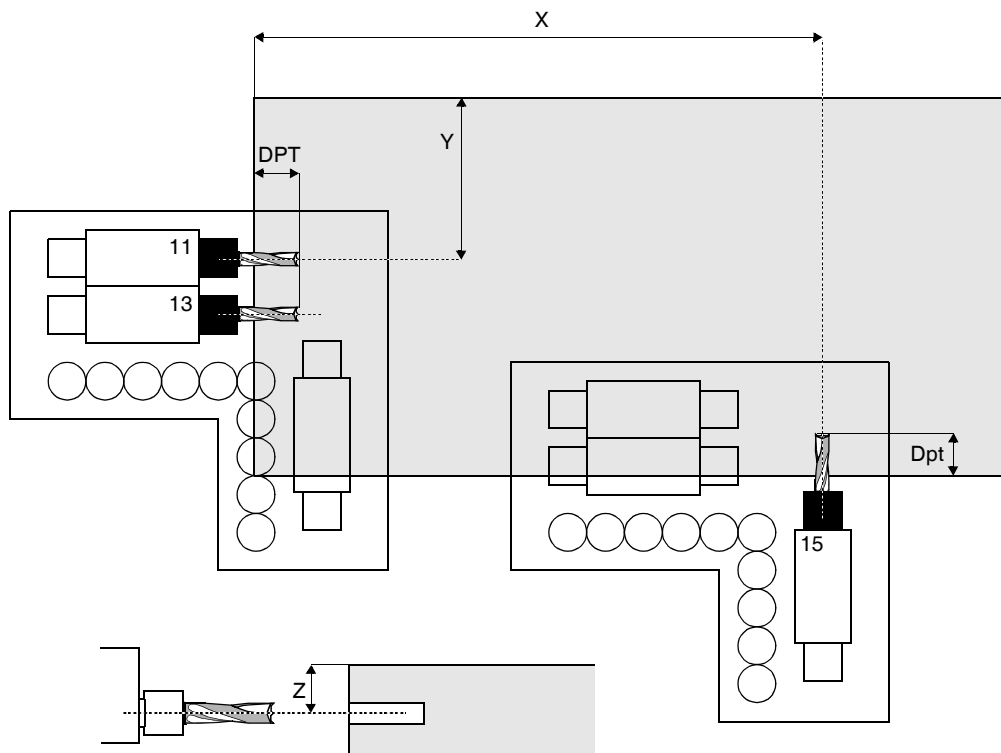
<Z>: initial co-ordinate of the boring along axis Z, referred to the first spindle entered in field <T>.

<PRF>: depth of boring, referred to the first spindle entered in field <T>. It is recommended that tools with the same overhang be used on the relevant spindles to prevent possible damages caused by an excessive boring depth.

<VEL>: rotation speed of the spindles.

<T>: number of the spindle to be used for the boring. If you want to use more than one spindle at the same time, enter a "." (point) between each spindle number (e.g., to use spindles 11 and 13 enter 11.13).

<Head>: for displaying the numbering of the spindles.
- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



### 5.9.6 Non-optimised horizontal boring with slot 2

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Hor.Bor.Bit> command; the name is displayed under the last row of icons of the open popup.
- 3) Press the ENTER key to set up the fields as indicated below.

<X>: initial co-ordinate of the boring along axis X.

<Y>: initial co-ordinate of the boring along axis Y.

<Z>: initial co-ordinate of the boring along axis Z.

<CAM>: access to the set-up of other data.

In the upper section of the pop-up opened with the <CAM> field, press the ENTER key to select the tool to be used for boring.

<Plane>: number of the side to bore.

<Depth>: boring depth.

<Interp. speed>: not used.

<Entry speed>: entry speed of the tool into the panel.

<Rotation speed>: rotation speed of the tool.

<No. Steps>: number of entries of tool into panel (zero corresponds to 1).

<Ri1

p>: boring repetition set-up.

<Type>: type of repetition.

Select <-> to repeat on a straight line.

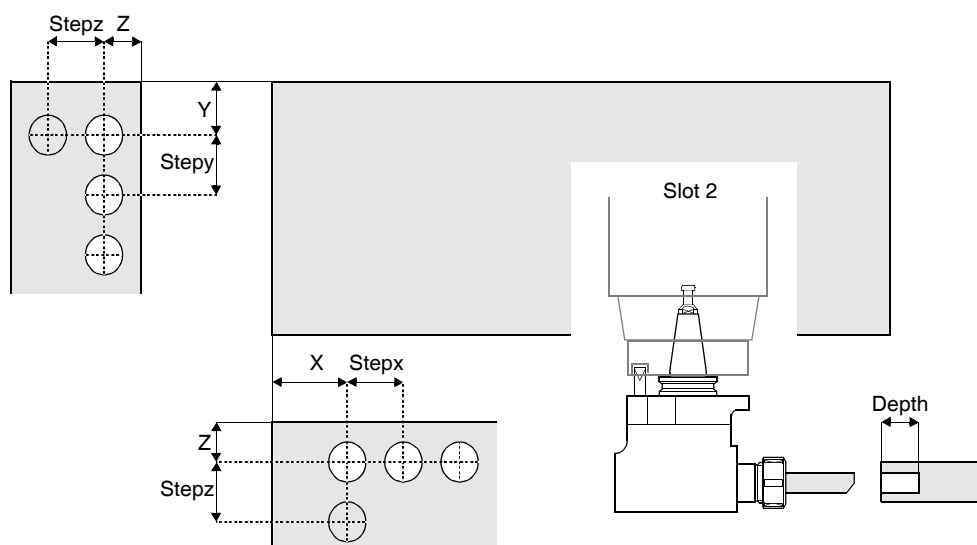
<Repeat>: total number of borings to execute during the repetition.

<Stepx>: centre distance between each boring to be executed along axis X, during the repetition.

<Stepy>: centre distance between each boring to be executed along axis Y, during the repetition.

<Stepz>: centre distance between each boring to be executed along axis Z, during the repetition.

- 4) Press the ENTER key on the <OK> field to confirm the programming. Press the ESC key to cancel.



## 5.10 PROGRAMMING ROUTING

Every type of routing procedure is carried out with the tool or aggregate mounted on slot 2, working along a trajectory consisting of geometrical elements (straight lines, arcs, etc.), geometrical figures (polygons) and patterns defined as "profiles" (preset by BIESSE or produced by the operator as "CAD profiles"). This section describes the possible procedures for this type of programming.

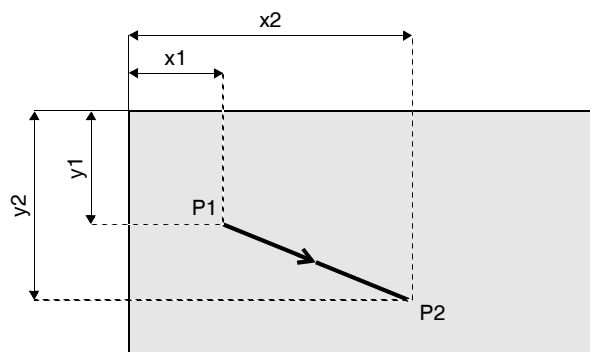
### 5.10.1 Routing of geometrical figures and elements

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Basic macro> option, or the <Various macros> option, to program routing of a slot (using the SLOT\_00 macro).
- 2) Select the macro desired (the name appears under the last row of icons of the open popup) and press the ENTER key to access setting of the fields, as described in "Description of the fields for programming routing procedures" (page 5-36).
- 3) When setting of the fields is complete, press the ENTER key on the <OK> field to confirm the programming; to abort press ESC. Then save the program.

The following is a description of the macros available for creating geometrical figures and elements. The parameters present in these macros are "local".

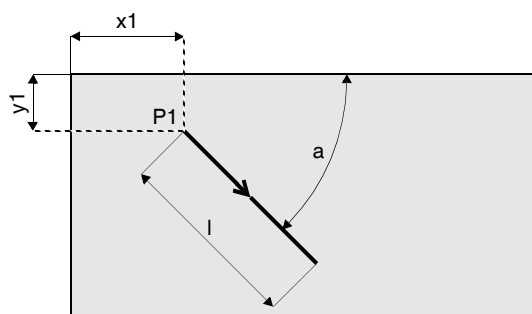
#### Macro LINE\_00

Creates a line between two points, P1 (first point) and P2 (second point). The parameters to be set during application of the macro are shown below..



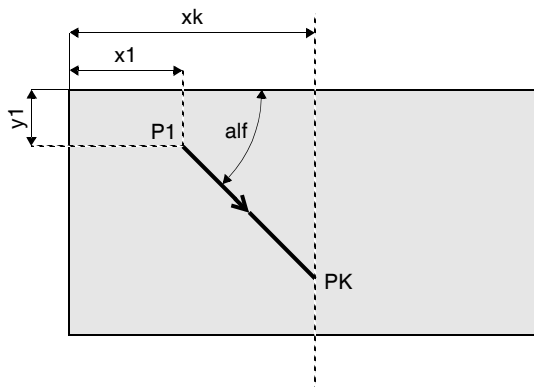
#### Macro LINE\_01

Creates a line which starts from point P1 with an angle <a> and length <l>. The parameters to be set during application of the macro are shown below..

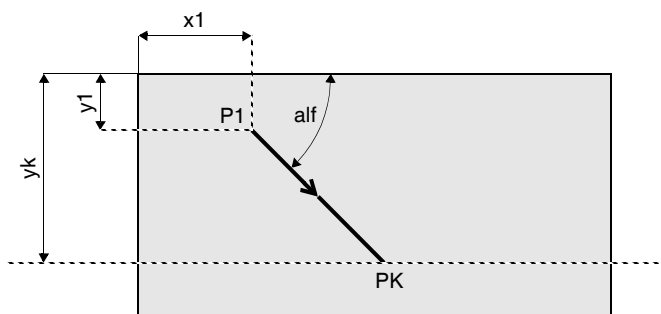


**Macro LANGXCOS**

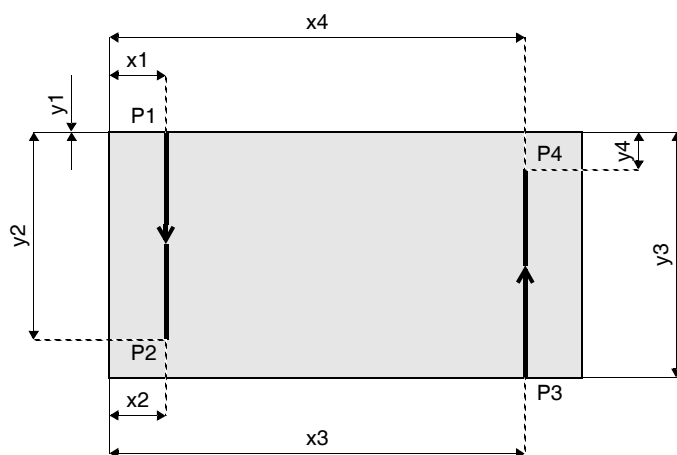
Creates a line which starts from point P1 with an angle <alf> (other than 90° and 270°) and ends on point PK, which is on a straight line parallel to side 1 and at a distance <xk> from it. The parameters to be set during application of the macro are shown below..

**Macro LANGYCOS**

Creates a line which starts from point P1 with an angle <alf> (other than 0° and 180°) and ends on point PK, which is on a straight line parallel to side 4 and at a distance <xk> from it. The parameters to be set during application of the macro are shown below..

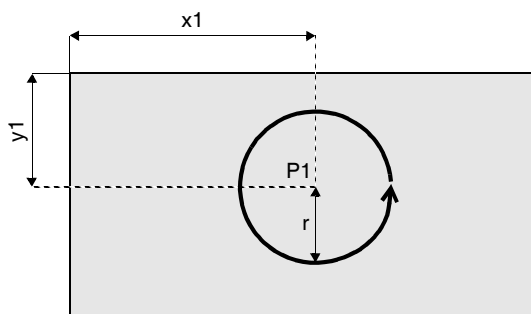
**Macro DUELINCO**

Creates two lines, the first between points P1 and P2 and the second between points P3 and P4. Generally these lines are programmed on opposite sides, for squaring the panel. The parameters to be set during application of the macro are shown below..

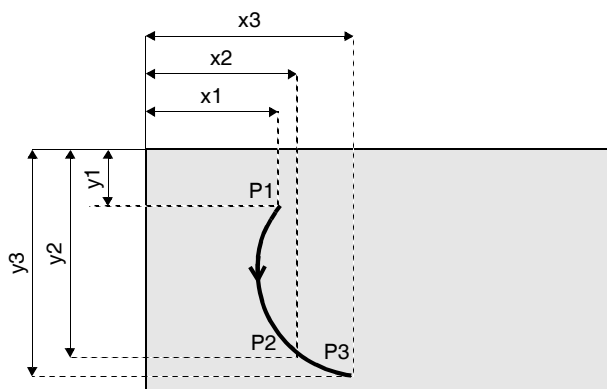


**Macro CIRCLE\_00**

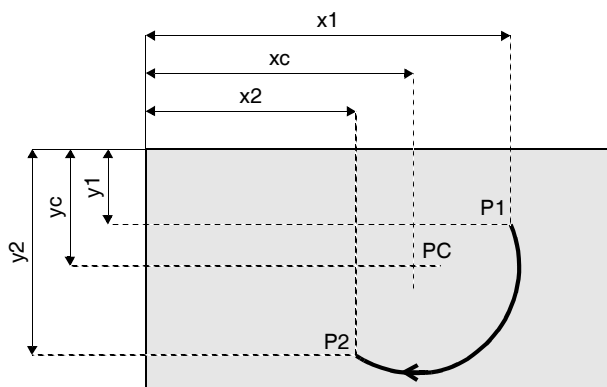
Creates a circle with centre on point P1 and radius <r>. The parameters to be set during application of the macro are shown below..

**Macro ARC3P**

Creates an arc passing through three points, P1 (first point), P2 (second point) and P3 (third point). The parameters to be set during application of the macro are shown below..

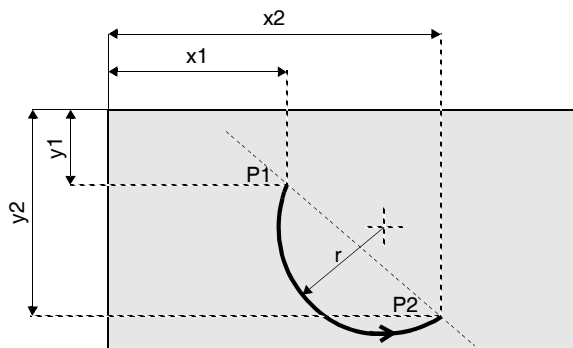
**Macro ARCC2P**

Creates an arc with centre on point PC and passing through two points, P1 (first point) and P2 (second point). The parameters to be set during application of the macro are shown below..

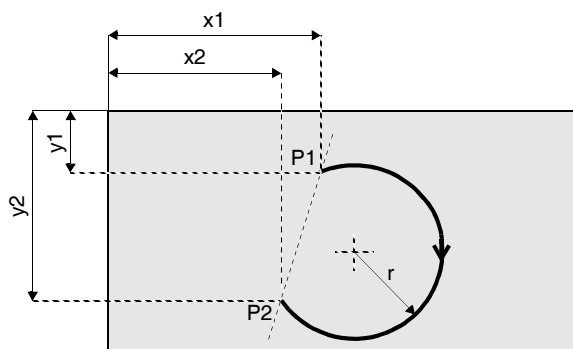


**Macro ARCR2P\_1**

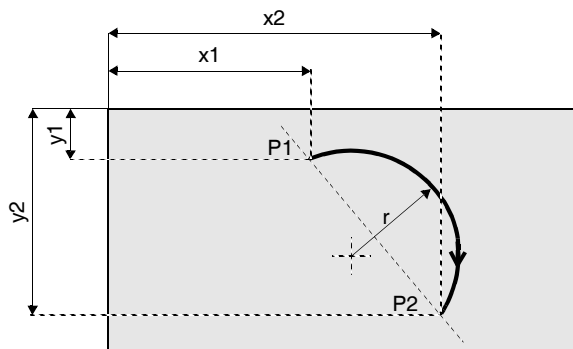
Creates an arc having opening less than  $180^\circ$  with radius  $\langle r \rangle$  and passing through two points, P1 (first point) and P2 (second point); the arc is calculated on the left of the straight line passing from point P1 to point P2. The parameters to be set during application of the macro are shown below..

**Macro ARCR2P\_2**

Creates an arc having opening greater than  $180^\circ$  with radius  $\langle r \rangle$  and passing through two points, P1 (first point) and P2 (second point); the arc is calculated on the right of the straight line passing from point P1 to point P2. The parameters to be set during application of the macro are shown below.

**Macro ARCR2P\_3**

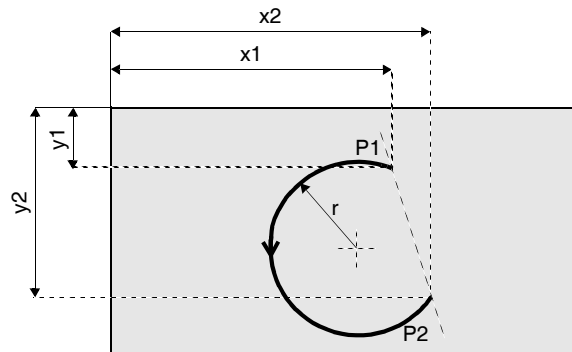
Creates an arc having opening less than  $180^\circ$  with radius  $\langle r \rangle$  and passing through two points, P1 (first point) and P2 (second point); the arc is calculated on the right of the straight line passing from point P1 to point P2. The parameters to be set during application of the macro are shown below..



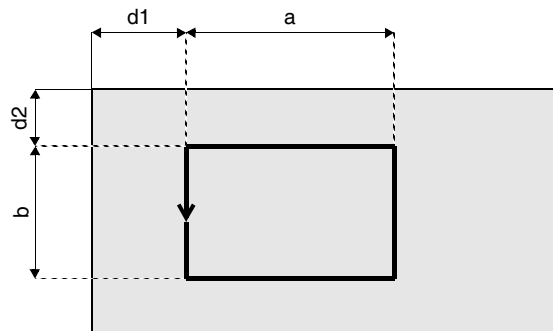


**Macro ARCR2P\_4**

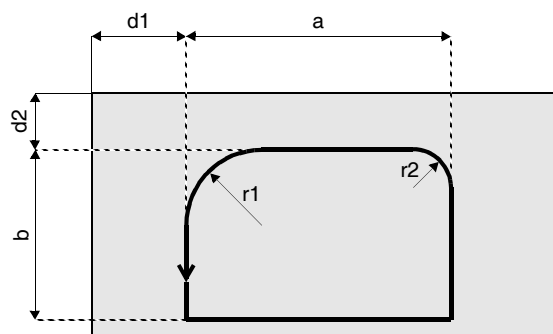
Creates an arc having opening greater than  $180^\circ$  with radius  $\langle r \rangle$  and passing through two points, P1 (first point) and P2 (second point); the arc is calculated on the left of the straight line passing from point P1 to point P2. The parameters to be set during application of the macro are shown below..

**Macro BOX\_00**

Creates a rectangle with right angles of length  $\langle a \rangle$  and width  $\langle b \rangle$  at a distance  $\langle d1 \rangle$  from side 1 and  $\langle d2 \rangle$  from side 4. The parameters to be set during application of the macro are shown below..

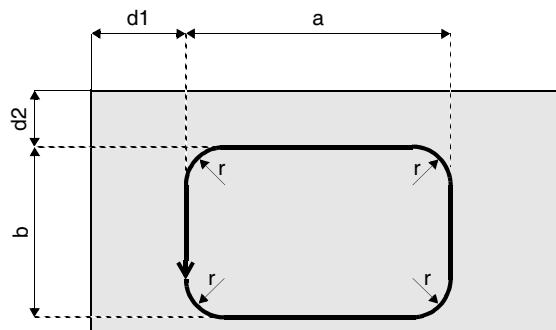
**Macro BOX\_01**

Creates a rectangle of length  $\langle a \rangle$  and width  $\langle b \rangle$  at a distance  $\langle d1 \rangle$  from side 1 and  $\langle d2 \rangle$  from side 4, with connecting arcs of radius  $\langle r1 \rangle$  on the top left-hand corner and of radius  $\langle r2 \rangle$  on the top right-hand corner. The parameters to be set during application of the macro are shown below..

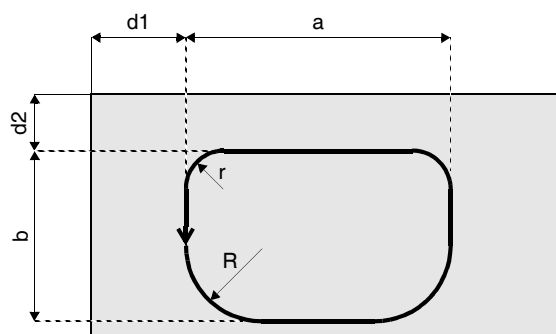


**Macro BOX\_02**

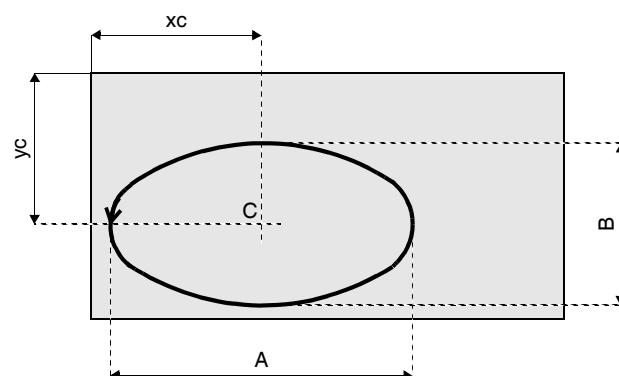
Creates a rectangle of length  $\langle a \rangle$  and width  $\langle b \rangle$  at a distance  $\langle d1 \rangle$  from side 1 and  $\langle d2 \rangle$  from side 4, with a connecting arc of radius  $\langle r \rangle$  on each corner. The parameters to be set during application of the macro are shown below..

**Macro BOX\_03**

Creates a rectangle of length  $\langle a \rangle$  and width  $\langle b \rangle$  at a distance  $\langle d1 \rangle$  from side 1 and  $\langle d2 \rangle$  from side 4, with connecting arcs of radius  $\langle r \rangle$  on the top corners and of radius  $\langle R \rangle$  on the bottom corners. The parameters to be set during application of the macro are shown below..

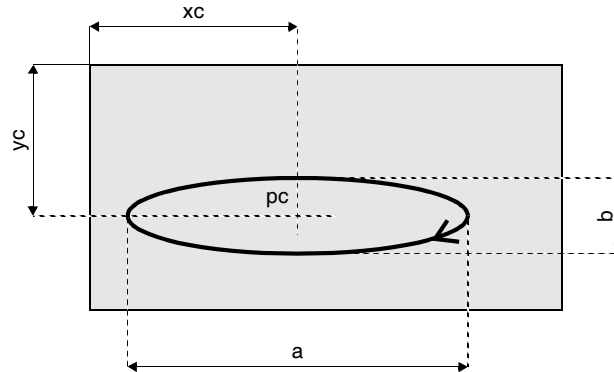
**Macro OVALE**

Creates an oval of length  $\langle A \rangle$  and width  $\langle B \rangle$  with centre on point C. The parameters to be set during application of the macro are shown below..

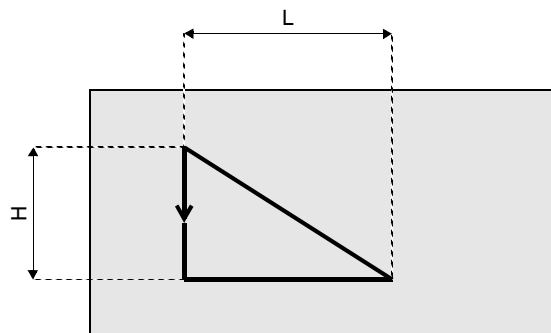


**Macro ELLISSE**

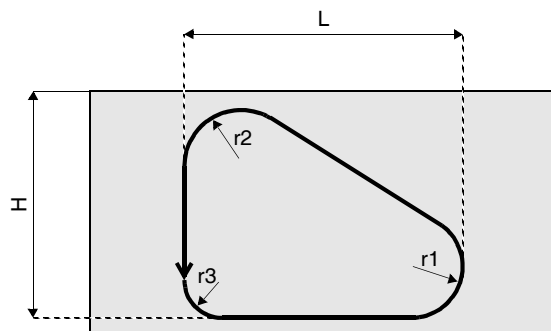
Creates an ellipse of length  $\langle a \rangle$  and width  $\langle d \rangle$  with centre on point  $pc$ . The parameters to be set during application of the macro are shown below..

**Macro TRIANG\_S**

Creates a right-angled triangle of length  $\langle L \rangle$  and width  $\langle H \rangle$ . The parameters to be set during application of the macro are shown below..

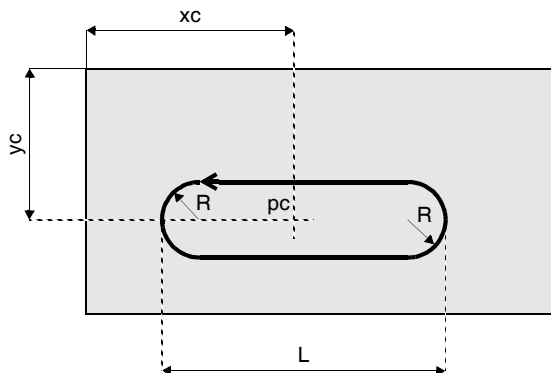
**Macro TRIANG\_R**

Creates a right-angled triangle of length  $\langle L \rangle$  with connecting arcs of radius  $\langle r2 \rangle$  on the top corner, of radius  $\langle r1 \rangle$  on the bottom right-hand corner and of radius  $\langle r3 \rangle$  on the bottom left-hand corner; the base of the triangle is at a distance  $\langle H \rangle$  from side 4. The parameters to be set during application of the macro are shown below..



**Macro ASOLA\_00**

Creates a slot of length  $\langle L \rangle$  and radius  $\langle R \rangle$ , with centre on point  $pc$ . The parameters to be set during application of the macro are shown below.

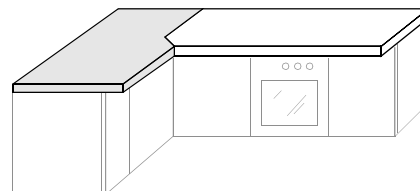
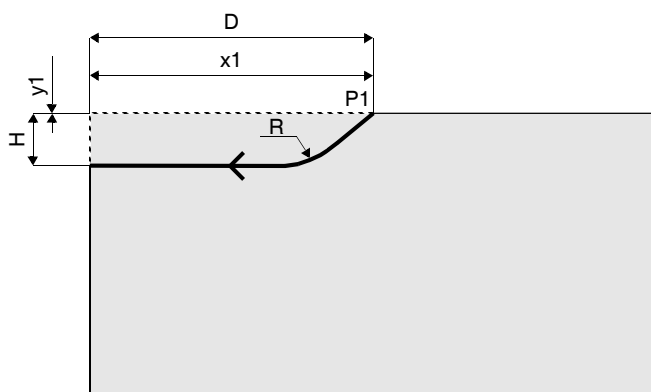
**5.10.2 Routing for assembly of tops at 90°**

- 1) From the «EDITOR\ASSISTED» page, select the  $\langle \text{Work} \rangle$  menu and the  $\langle \text{Bores, Cuts} \rangle$  option.
- 2) Select the macro desired (the name appears under the last row of icons of the open popup) and press the ENTER key to access setting of the fields, as described in paragraph "Description of the fields for programming routing procedures" (page 5-36).
- 3) When setting of the fields is complete, press the ENTER key on the  $\langle \text{OK} \rangle$  field to confirm the programming; to abort press ESC. Then save the program.

The following is a description of the macros available for creating the two parts (male and female) for assembly. The parameters present in these macros are "local".

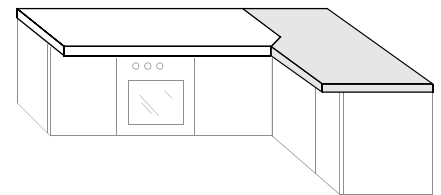
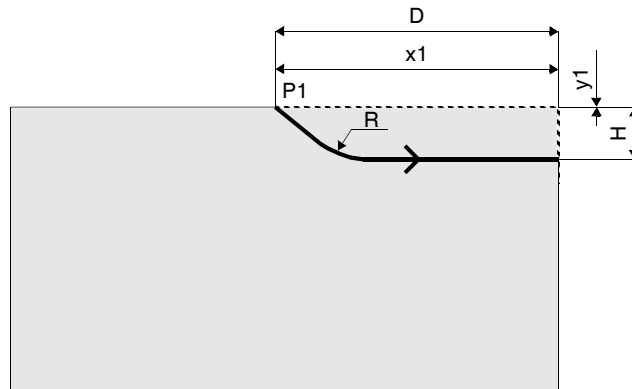
**Macro TOPDORSX**

Creates a working trajectory (from point P1) which will produce the "female part of the left-hand corner". The parameters to be set during application of the macro are shown below.

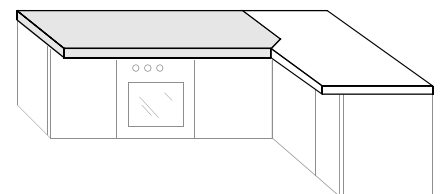
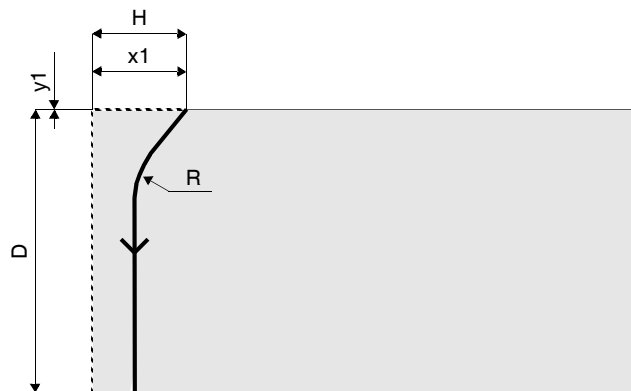


**Macro TOPDORDX**

Creates a working trajectory (from point P1) which will produce the "female part of the right-hand corner". The parameters to be set during application of the macro are shown below..

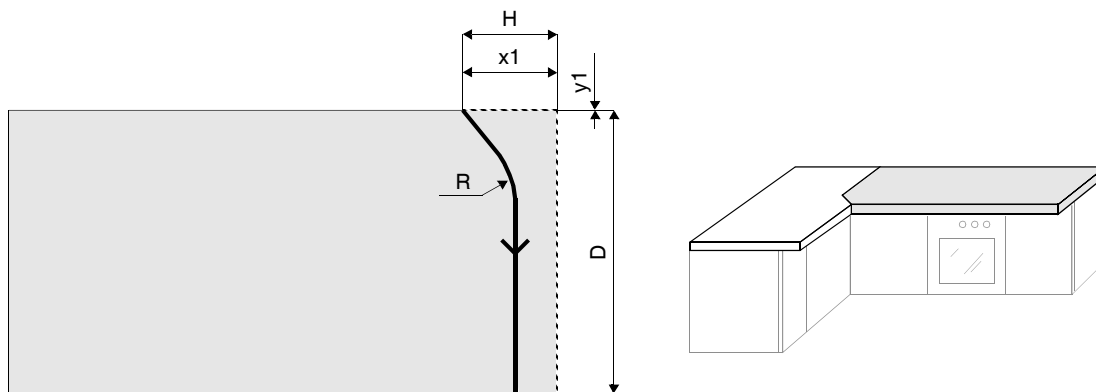
**Macro TOPDVESX**

Creates a working trajectory (from point P1) which will produce the "male part of the right-hand corner". The parameters to be set during application of the macro are shown below..



### Macro TOPDVEDX

Creates a working trajectory (from point P1) which will produce the "male part of the left-hand corner". The parameters to be set during application of the macro are shown below..



#### 5.10.3 Routing CAD profiles

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Profilo CAD> command (the name appears under the last row of icons of the open popup) and press the ENTER key to access setting of the fields, as described in paragraph "Description of the fields for programming routing procedures" (page 5-36).
- 3) When setting of the fields is complete, press the ENTER key on the <OK> field to confirm the programming; to abort press ESC. Then save the program.

#### 5.10.4 Routing of door profiles preset by BIESSE.

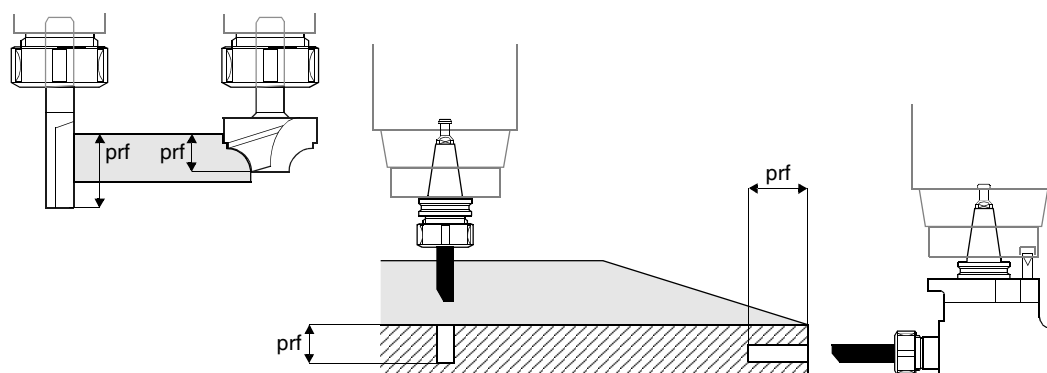
- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Misc. Macro> option.
- 2) Select the macro desired (the name appears under the last row of icons of the open popup) and press the ENTER key to access setting of the fields, as described in paragraph "Description of the fields for programming routing procedures" (page 5-36).
- 3) When setting of the fields is complete, press the ENTER key on the <OK> field to confirm the programming; to abort press ESC. Then save the program.

#### 5.10.5 Description of the fields for programming routing procedures

<CAM>: access to setting of technological data.

Press the ENTER key in the top part of the popup opened with the <CAM> field to select the tool to be used for the routing procedure.

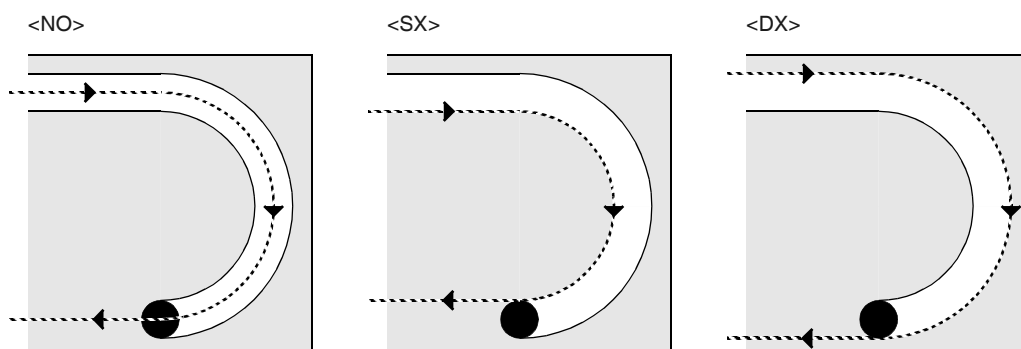
**<Depth>**: routing depth (dpt).



**<Plane>**: number of the side on which the routing procedure is to be carried out.

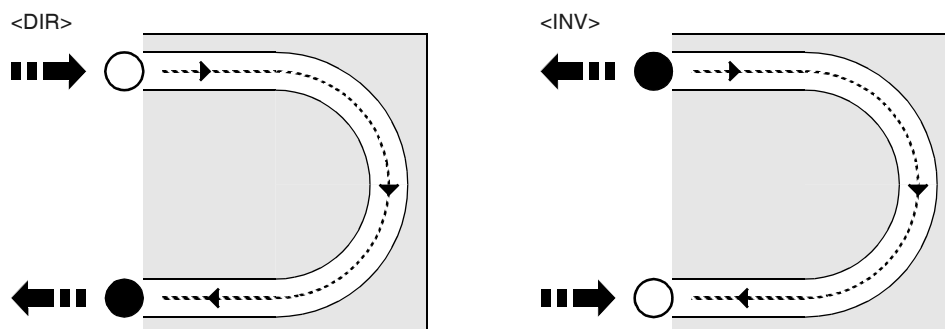
**<Correction>**: tool position in relation to the work trajectory.

Select <NO> to locate the tool in the centre of the trajectory, <Lh> to locate the tool on the left of the trajectory, or <Rh> to locate the tool on the right of the trajectory. posizione dell'utensile rispetto alla traettoria di lavoro..



**<Direction>**: tool feed direction during routing.

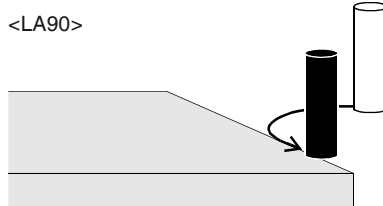
Select <DIR> for the basic direction of the geometrical element or <REV> to reverse the basic direction of the geometrical element..



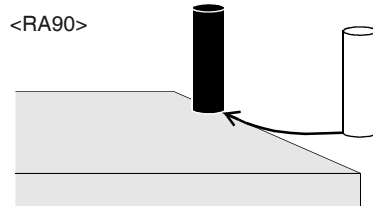
<In>: movement which the tool performs to enter the working trajectory.

Select <NO> to enter without setting, <LA90> to enter with circular connecting movement at 90° on the left of the trajectory, <RA90> to enter with circular connecting movement at 90° on the right of the trajectory, <3D\_LA> to enter with spiral connecting movement at 90° on the left of the trajectory, <3D\_RA> to enter with spiral connecting movement at 90° on the right of the trajectory, <3DC\_A> to enter with downward approach connecting on the centre of the trajectory, <3DC\_L> to enter with straight downward approach on the centre of the trajectory, or <CAD> to enter as set by the CAD..

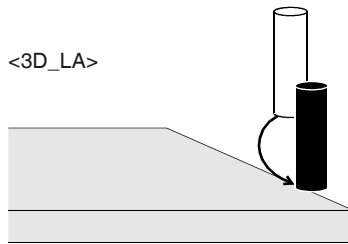
&lt;LA90&gt;



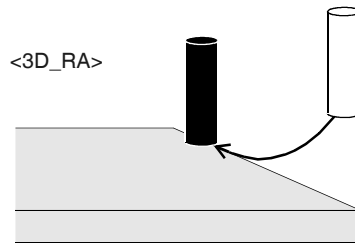
&lt;RA90&gt;



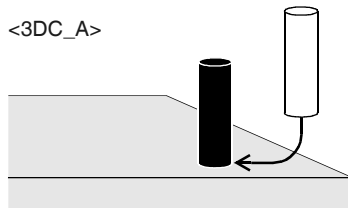
&lt;3D\_LA&gt;



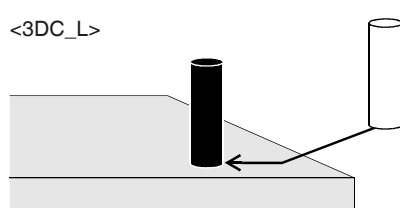
&lt;3D\_RA&gt;



&lt;3DC\_A&gt;



&lt;3DC\_L&gt;

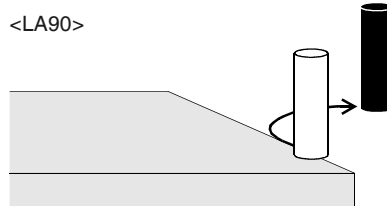




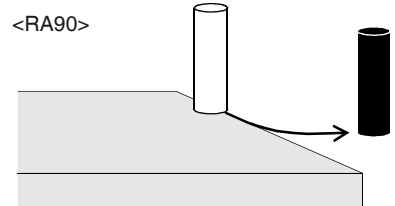
**<Out>**: movement which the tool performs to exit from the working trajectory.

Select **<NO>** to exit without setting, **<LA90>** to exit with circular connecting movement at 90° on the left of the trajectory, **<RA90>** to exit with circular connecting movement at 90° on the right of the trajectory, **<3D\_LA>** to exit with spiral connecting movement at 90° on the left of the trajectory, **<3D\_RA>** to exit with spiral connecting movement at 90° on the right of the trajectory, **<3DC\_A>** to exit with upward connecting movement on the centre of the trajectory, **<3DC\_L>** to exit with straight upward movement on the centre of the trajectory, or **<CAD>** to exit as set by the CAD..

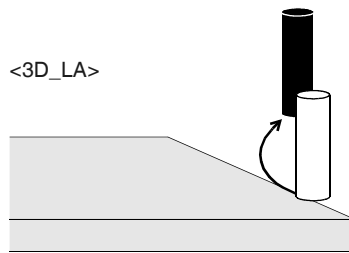
&lt;LA90&gt;



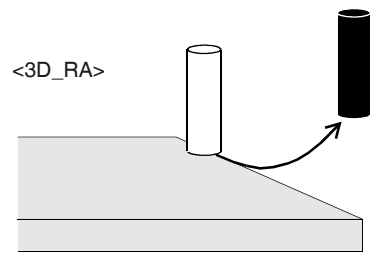
&lt;RA90&gt;



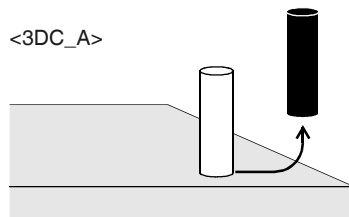
&lt;3D\_LA&gt;



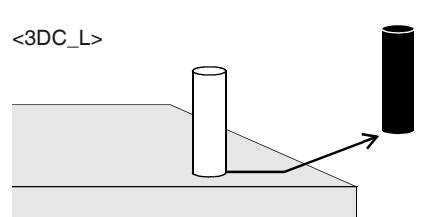
&lt;3D\_RA&gt;



&lt;3DC\_A&gt;



&lt;3DC\_L&gt;



**<Join>**: execution of connections between elements (of the macro) which are not tangents but which intersect at an angle smaller than the value indicated later in **<Tolerance Ang>**. Select **<Y>** to perform the connections or **<N>** not to perform them.

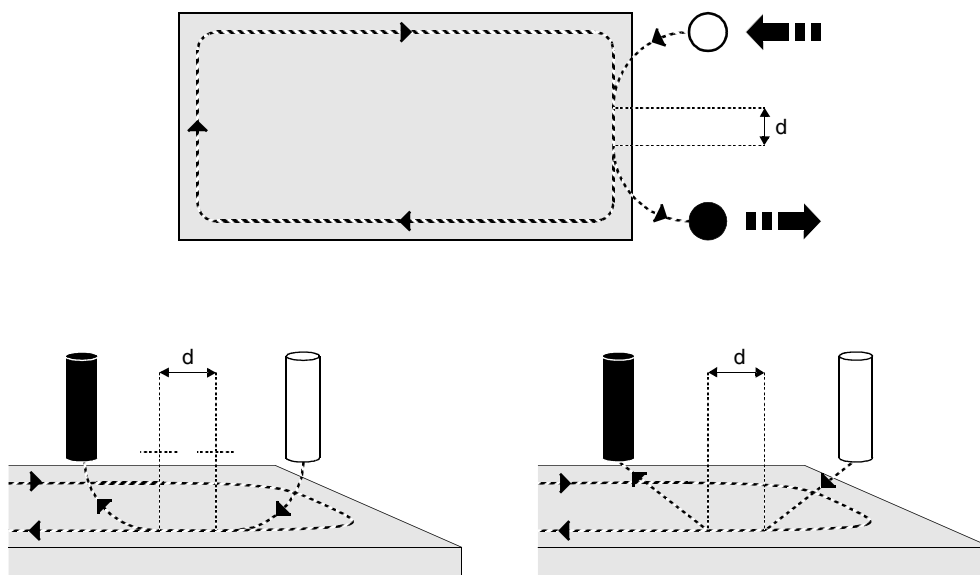
**<Interp.Speed>**: router feed speed.

**<Entry Speed>**: entry speed of tool into panel.

**<Rotation Speed>**: rotation speed of the tool.

<**No.steps**>: number of times the panel enters the panel to complete the routing procedure (zero is the same as 1).

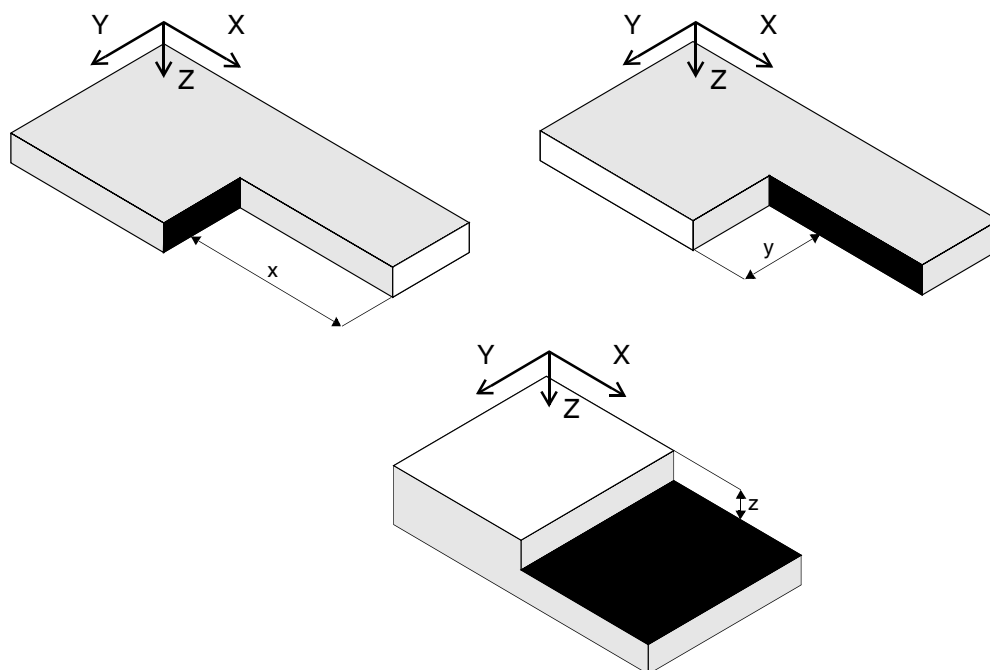
<**Distance in-out**>: centre distance (d) between the points where the working trajectory enters and leaves the panel..



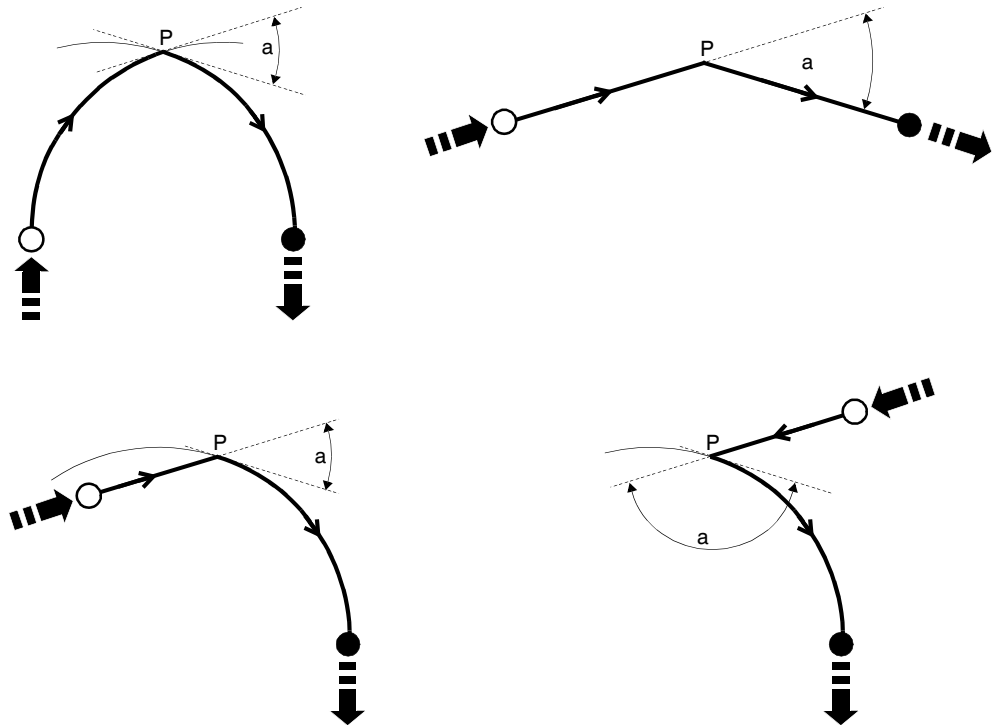
<**2nd machining**>: quantity of material to be removed during the finishing stage.

<**2nd mach speed**>: tool feed speed during the finishing stage.

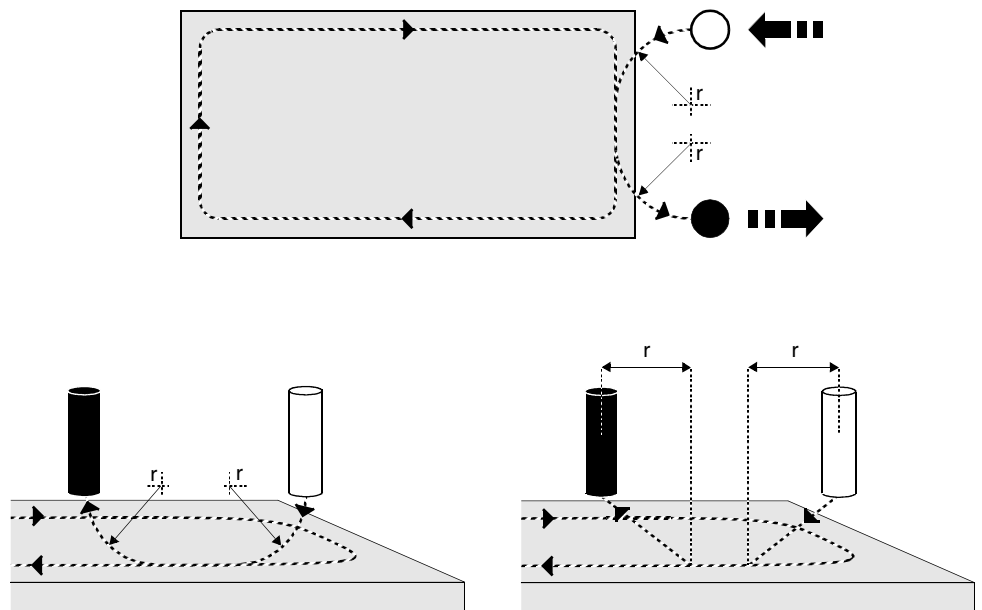
<**Groove**>: value by which the side to be processed is translated in relation to the main side already indicated in <Plane>..



**<Tolerance angle>**: value of the angle ( $a$ ) for execution of the connections (see <Connections> field)..



**<Radius in-out>**: radius ( $r$ ) of the connecting arc between the working trajectory entry and exit points..

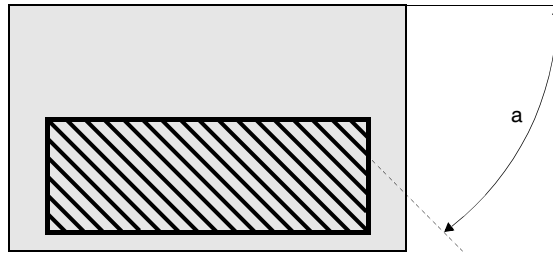


**<Util>**: access to the set-up of other data.

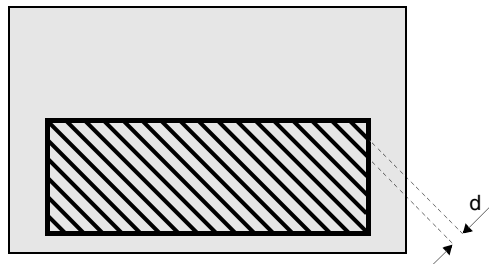
**ROTATION <Angle>**: angle for flat rotation of the geometrical figure or element on its own centre.

**FILL <Yes/No>**: routing inside the geometrical figure (polygon).  
Select <Y> to perform the routing process, <N> not to perform it.

**FILL <Angle>**: angle (a) of the working trajectories during routing inside the polygon..



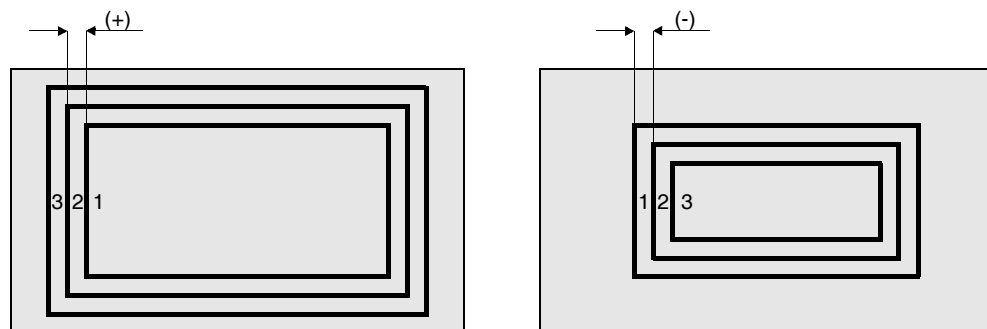
**FILL <Delta>**: distance (d) between the working trajectories during routing inside the polygon..



**FILL <Depth>**: depth of the working trajectories during routing inside the polygon.

**CONCENTRIC <No.>**: number of concentric polygons to be routed.

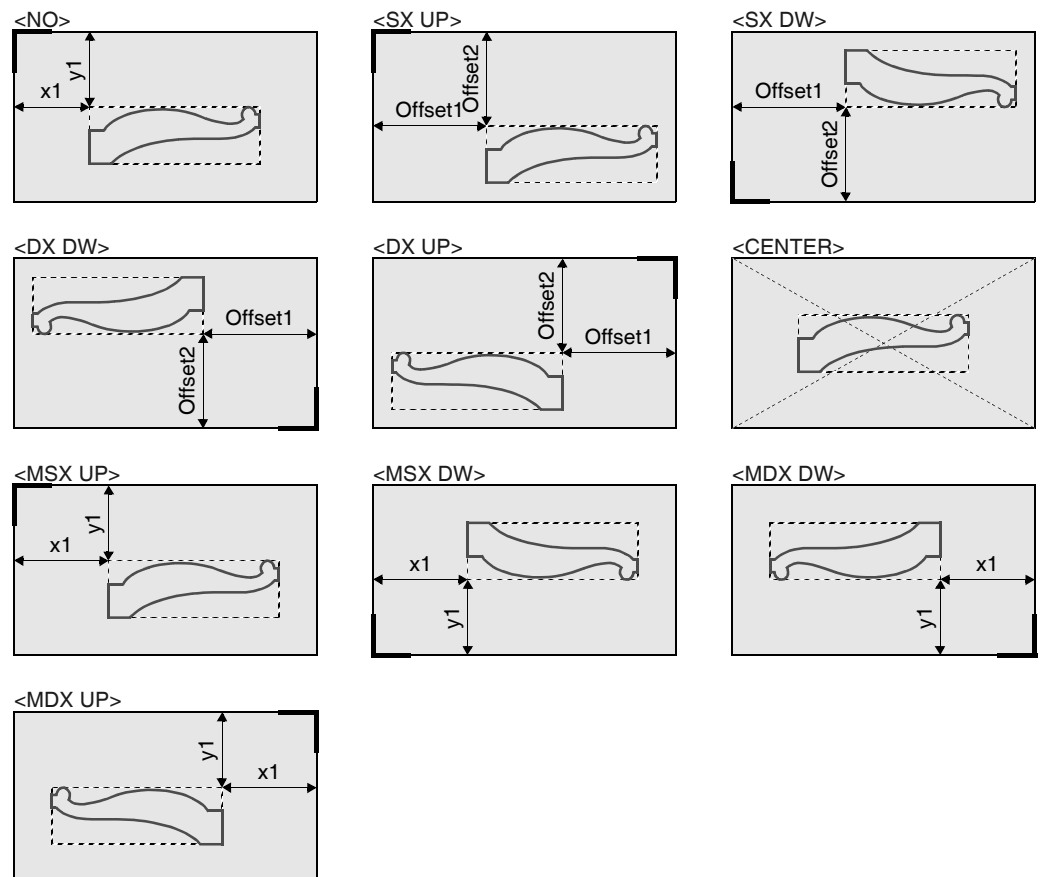
**CONCENTRIC <Delta>**: distance between the concentric polygons to be routed. If the distance has a positive (+) value, the concentrics are routed on the outside of the polygon; if the distance is negative (-) they are routed on the inside..



**CONCENTRIC <Depth>**: depth of the concentric polygons to be routed.

**JUSTIFICATION <Corner>**: panel reference corner for the position of the element or geometrical figure (also defined as the "object");  
Select <NO> to position the object at the distance (from sides 1 and 4) shown in the parameters;

<SX UP> for the mirror image of the object in the direction of the top left-hand corner at the distance set later in <Offset 1> and <Offset 2>;  
 <SX DW> for the mirror image of the object in the direction of the bottom left-hand corner at the distance set later in <Offset 1> and <Offset 2>;  
 <DX DW> for the mirror image of the object in the direction of the bottom right-hand corner at the distance set later in <Offset 1> and <Offset 2>;  
 <DX UP> for the mirror image of the object in the direction of the top right-hand corner at the distance set later in <Offset 1> and <Offset 2>;  
 <CENTER> to position the object in the centre of the panel.;  
 <MSX UP> for the mirror image of the object in the direction of the top left-hand corner at the distance (x1, y1) from the sides, shown in the parameters.  
 <MSX DW> for the mirror image of the object in the direction of the bottom left-hand corner at the distance (x1, y1) from the sides, shown in the parameters.  
 <MDX DW> for the mirror image of the object in the direction of the bottom right-hand corner at the distance (x1, y1) from the sides, shown in the parameters.  
 <MDX UP> for the mirror image of the object in the direction of the top right-hand corner at the distance (x1, y1) from the sides, shown in the parameters..



**JUSTIFICATION <Offset1>:** distance of the element or geometrical figure from side 4.

**JUSTIFICATION <Offset2>:** distance of the element or geometrical figure from side 1.

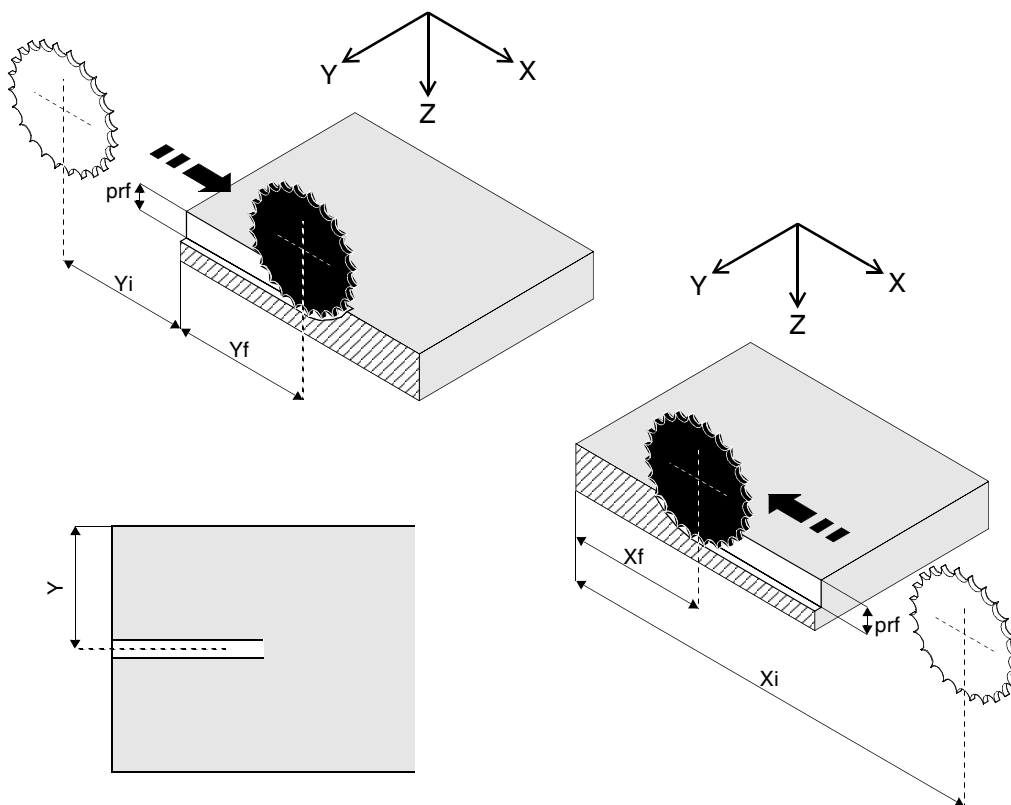
**<Param>:** access to setting of the local parameters of the macro.

## 5.11 VERTICAL CUT ALONG THE X AXIS

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Taglio X> command (the name appears under the last row of icons of the open popup).
- 3) Press the ENTER key to set up the fields as indicated below:
  - <Y>: coordinate of the cut along Y axis.
  - <Xi>: initial coordinate of the cut along X axis.
  - <Xf>: final coordinate of the cut long X axis.
  - <CAM>: access to the set-up of other data.

Press the ENTER key in the top part of the popup opened with the <CAM> field to select the tool to be used for the cut.

  - <Plane>: not used (number of the side on which the cut will be made).
  - <Depth>: cut depth (dpt).
  - <Interp. Speed>: not used.
  - <Entry speed>: entry speed of tool into panel.
  - <Rotation Speed>: rotation speed of the tool.
  - <No.steps>: number of times the panel enters the panel to complete the cut (zero is the same as 1).
- 4) Press the ENTER key on the <OK> field to confirm the programming; to abort press ESC..



## 5.12 VERTICAL CUT ALONG THE Y AXIS

- 1) From the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, Cuts> option.
- 2) Select the <Taglio Y> command (the name appears under the last row of icons of the open popup).
- 3) Press the ENTER key to set up the fields as indicated below.
 

<X>: coordinate of the cut along X axis.

<Yi>: initial coordinate of the cut along Y axis.

<Yf>: final coordinate of the cut long Y axis.

<CAM>: access to the set-up of other data.

Press the ENTER key in the top part of the popup opened with the <CAM> field to select the tool to be used for the cut.

<Plane>: not used (number of the side on which the cut will be made).

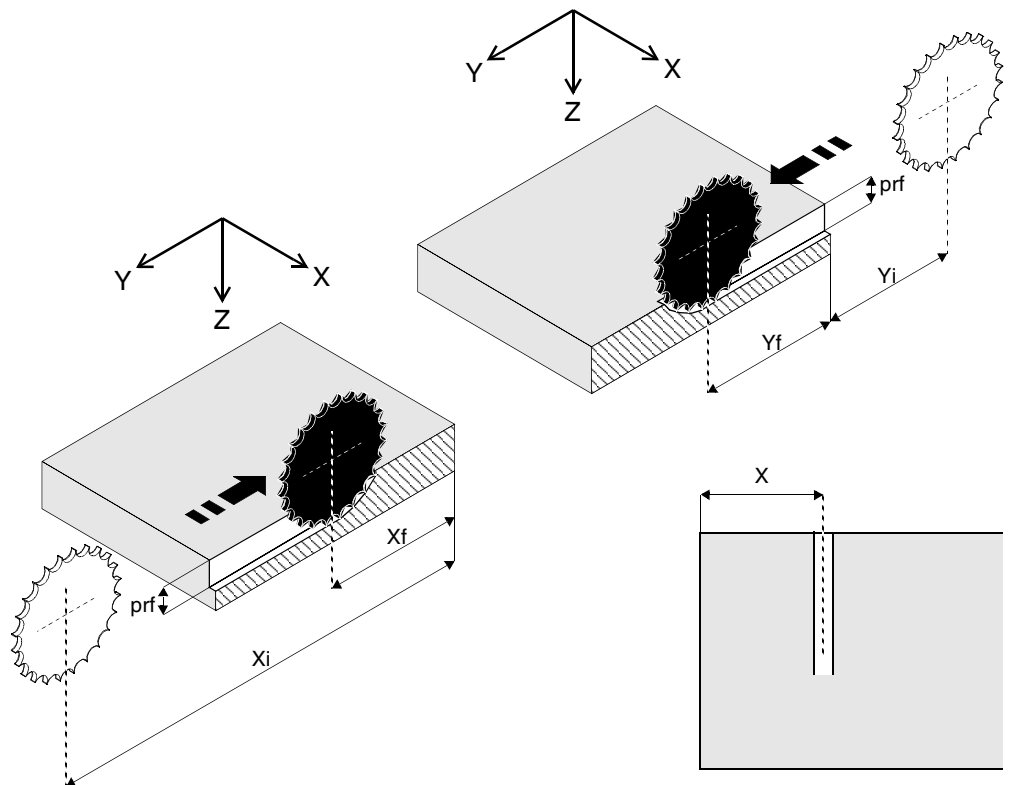
<Depth>: cut depth (dpt).

<Interp. Speed>: not used.

<Entry speed>: entry speed of tool into panel.

<Rotation speed>: rotation speed of the tool.

<No.steps>: number of times the panel enters the panel to complete the cut (zero is the same as 1).
- 4) Press the ENTER key on the <OK> field to confirm the programming; to abort press ESC..



## 5.13 PROGRAMMING STEPS

The “programming steps” are instructions inserted between the program lines to modify its execution by adding special functions. The programming steps which can be used when setting the program are described below.

### 5.13.1 Jumping a program line

This instruction allows the user to set a "condition" which is automatically checked by the NC. If this condition is met, the program jumps to the line which contains the "label" used in the condition; if the condition does not occur the program continues normally.

The condition syntax is:

If[...] Is[...] To/than[...] Jump to label[...]

and it instructs the NC:

[if the first value] [is equal, less or greater] [to/than the second value][jump to the label and continue execution of the program].

The user may set a number of jumps inside the program, using a procedure which depends on the type of machining programmed. During setting, the user may type the names of the parameters and formulate expressions.

- 1) For optimized boring, access the «EDITOR\OPTIMISED BORINGS» page and select the <Holes> menu and then set the condition as described below. For non optimized boring, routing and cuts, access the «EDITOR\ASSISTED» page, select the <Work> menu and the <Bores, cuts> option and then set the condition as described below.
- 2) Select the <If..> instruction; the name appears under the last row of icons of the open popup.
- 3) Press the ENTER key to access setting of the fields as indicated below:  

<If>: type the first value, which is to be checked.

In the next field, select the relational operator.  
 Select "=" if the first value is to be equal to the second, "<" if the first value is to be smaller than the second, or ">" if the first value is to be greater than the second.

Type the second value, to which the first value is to be referred, in the field below.

<Jmp>: type the name of the label.
- 4) Press the ENTER key on the <Ok> field to confirm the programming; to abort press ESC.
- 5) To enter the label, select the <Label> instruction; the name appears under the last row of icons of the open popup.
- 6) Type the name of the label and press ENTER on the <Ok> field to confirm the programming; to abort press ESC.
- 7) Then move the line containing the label to the point desired, as described in “Moving a program line” (page 5-7) and save the program.

### 5.13.2 Linear tool movement in 3D

This instruction allows the user to obtain a linear movement with the slot 2 tool, along a straight line which starts from point PA on which the tool is located and finishes at point PB defined by



the coordinates (referred to the program point of origin). One or more 3D linear movements can be inserted between the program lines, as described below.

- 1) From the «EDITOR/ASSISTED» page, locate the cursor above the line which is to contain the linear movement, then select the <Work> menu and the <Bores, cuts> option.
- 2) Set the tool which is to perform the movement, by selecting the <Tool> instruction; the name appears under the last row of icons of the open popup.
- 3) Press ENTER to access setting of the fields, as follows:

<CAM>: access to the data to be set.

In the top part of the popup opened with the <CAM> field, press ENTER to select the tool.

<Interp. Speed>: the travel speed of the tool during the movement.

<Entry speed>: entry speed of tool into panel.

<Rotation speed>: rotation speed of the tool.

- 4) Press the ENTER key on the <Ok> field to confirm the programming; to abort press ESC.
- 5) Set the coordinates of the point where the linear movement is to end, by selecting the <3D Line> instruction; the name appears under the last row of icons of the open popup.
- 6) Press ENTER to access setting of the fields, as follows.

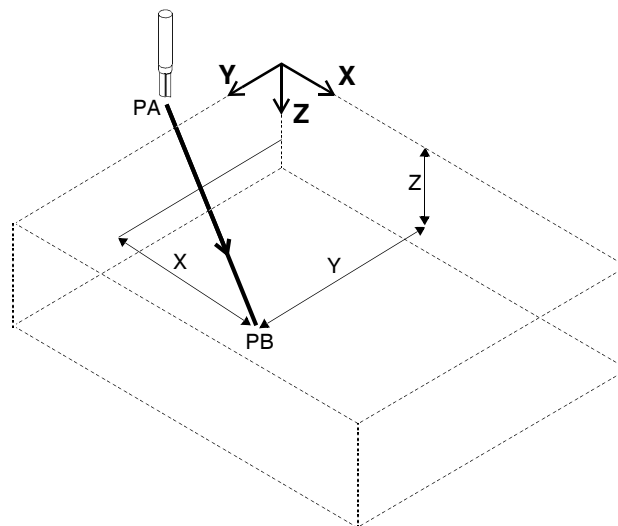
<X>: coordinate of the point along the X axis.

<Y>: coordinate of the point along the Y axis.

<Z>: coordinate of the point along the Z axis (with number “zero” the coordinate corresponds to the plane of side 5).

<CAM>: access to setting of the interpolation speed.

<Interp. Speed>: the travel speed of the tool during the movement.

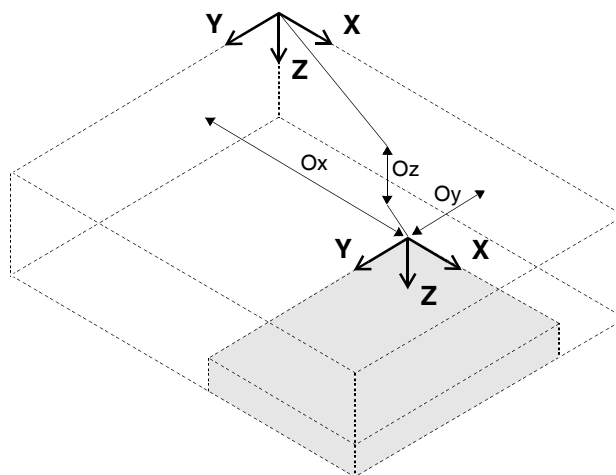


- 7) Press the ENTER key on the <Ok> field to confirm the programming; to abort press ESC.
- 8) Save the program.

### 5.13.3 Temporary traslation of program point of origin

This instruction allows the program point of origin to be temporarily shifted. One or more shifts can be inserted between the program lines, as described below.

- 1) From the «EDITOR/ASSISTED» page, locate the cursor above the line which is to contain the point of origin shift, then select the <Work> menu and the <Bores, cuts> option.
- 2) Select the <Delta> instruction; the name appears under the last row of icons of the open popup.
- 3) Press ENTER to access setting of the fields, as follows:  
 <Ox>: coordinate along the X axis.  
 <Oy>: coordinate along the Y axis.  
 <Oz>: coordinate along the Z axis.



- 4) Press the ENTER key on the <Ok> field to confirm the programming; to abort press ESC.
- 5) Save the program.

### 5.13.4 Integration of optimized boring

This instruction allows the user to modify the sequence of the procedures to be carried out; normally the NC first performs the procedures programmed from the «EDITOR/OPTIMIZED BORING» page, meaning all the optimized boring procedures, and then the processes programmed from the «EDITOR/ASSISTED» page, meaning non optimized boring processes, routing processes and cuts. To integrate an optimized boring procedure amongst the other processes, proceed as described below.

- 1) From the «EDITOR/ASSISTED» page, locate the cursor above the line which is to contain the integration of optimized boring, then select the <Work> menu and the <Bores, cuts> option.
- 2) Select the <Ins. OPT. BOR.> instruction; the name appears under the last row of icons of the open popup.
- 3) Save the program.

### 5.13.5 Program stops

“Stops” are breaks in the program which allow the operator to change the position of the panel on the working table. One or more stops can be inserted between the program lines as indicated below.

- 1) From the «EDITOR\ASSISTED» page, locate the cursor above the line to contain the stop.
- 2) Press the ARROW key, select the <Sosp> menu and the stop desired:  
 <With transl.> stops the process to translate the panel inside the working area,  
 <With release> stops the process to tilt the panel in the same working area,  
 <No release> stops the process without releasing the panel, to clean the working area.
- 3) Then save the program.



#### INFORMATION

**If optimized borings are programmed beyond the value indicated in the <X of sosp.> field (of the «EDITOR\PROGRAM DATA» page), during the <START> of performance of the program the NC automatically creates a stop.**

## 5.14 DOWNLOADING EXTERNAL FILES

It is possible to download external files having extensions \*.CID and \*.DXF (2D, gen) as described below.

- 1) From the «EDITOR\PROGRAM DATA» page, select the <Files> menu.
- 2) Select the option with the extension corresponding to the file to be opened.
- 3) Select <A:> in the <Drive> field.
- 4) Select the name of the file to be opened and press ENTER.
- 5) Press the ENTER key on the <Ok> field to confirm the operation.
- 6) Save the program if considered necessary.

## 5.15 CREATING THE WORK LIST

The work list is a table which allows the user to organize the machine's working stages. The list defines the programs to be used for machining preset quantities of panels. To create a work list, proceed as follows.

- 1) From the «AUTOMATIC\LIST» page, select the <Files> menu and the <New> option.
- 2) Access the list and set fields for each line, as explained below.

**<Name>**: name of the program to be executed. To access the program list, press ENTER on the right-hand side of the field and select the program, then press ENTER on the <Ok> field to confirm the operation.

**<Q>**: number of panels to be machined with the relative program.

**<F>**: do not use; in this field the NC indicates the number of panels which have been machined during execution of the program.

<Comment>: in this field the user may type a comment (maximum 10 characters) relating to the program or enter a "list line jump".

<P>: to access the program parameters.

- 3) To save the list setting, select the <Files> menu and the <Save> option.
- 4) In the <File> field, type the name of the list (maximum 8 characters).
- 5) Press ENTER on the <Ok> field to confirm the operation; the file is automatically created with extension \*.DST.

## 5.16 OPENING, MODIFYING AND SAVING THE WORK LIST

- 1) From the «AUTOMATIC\LIST» page, select the <Files> menu and the <Open> option.
- 2) Select the name of the list to be opened and press ENTER.
- 3) Press ENTER on the <Ok> field to confirm the operation.
- 4) Modify the list; to access the menus which allow the user to add, shift, delete or reset a list line, press the ARROW key and proceed with the operation as described below.

### Adding a line to the list

Locate the cursor on the point where the new line is to be added and select the <Ins> menu. Then set the added line.

### Shifting a line of the list

Locate the cursor on the line to be shifted. Select the <Swap> menu, with F3 to shift one line down, or F4 to shift one line up.

### Resetting the number of panels machined by a line of the list

Locate the cursor on the line to be reset and select the <Reset> menu.

### Deleting a line from the list

Locate the cursor on the line to be deleted and select the <Del> menu.

### Adding list line jumps

Locate the cursor on the <Comment> field of the line where the jump is to start and set using the following syntax:

JMP [name of label]

Then locate the cursor on the <Comment> field of the line where the jump is to finish, and type the name of the label.

- 5) When the modification is complete, save the list. Select the <Files> menu and the <Save> option.
- 6) If the previous name is to be maintained, press ENTER on the <Ok> field; otherwise, type the name of the program in the <File> field (maximum 8 characters).

- 7) Press ENTER on the <Ok> field to confirm the operation; the file is automatically created with extension \*.DST.

## 5.17 DELETING THE WORK LIST

- 1) From the «AUTOMATIC\LIST» page, select the <Files> menu and the <Delete> option to delete a chosen list, or the <Del. all> option to delete all the lists in the NC memory at the same time.
- 2) Select the name of the list to be deleted and press ENTER on the <Ok> field to confirm the operation, or ESC to abort.



# Chapter 6

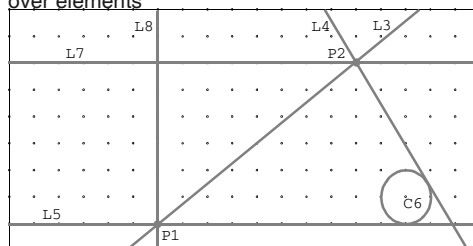
## PROGRAMMING CAD PROFILES

### 6.1 CAD PROFILE PROGRAMMING DESCRIPTION

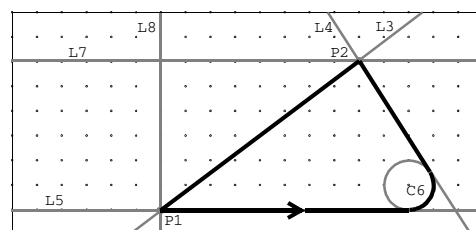
CAD profile programming is the creation of designs called "profiles" by means of the CAD (graphics editor) in the Editor environment of the NC. The profile is simply a working trajectory for the tool, to be used during programming of routing.

CAD profiles are programmed on the CAD page in two phases. First the base design is produced, and then in the second stage the profile is obtained by tracing over all or part of it. It is also possible to create the profile by joining up points.

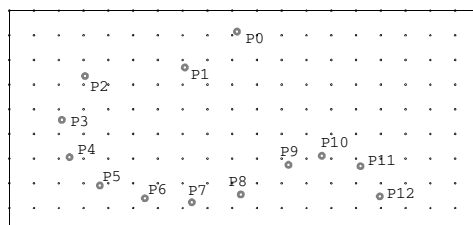
base design of profile to effect a tracing operation over elements



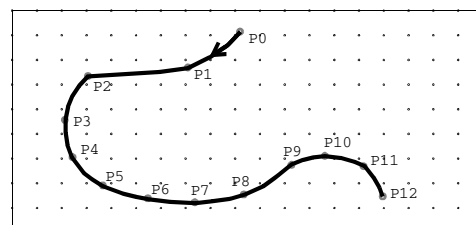
Profile obtained by tracing over elements



base design of profile to join up points

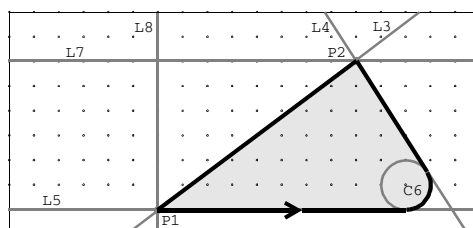


Profile obtained by joining up points

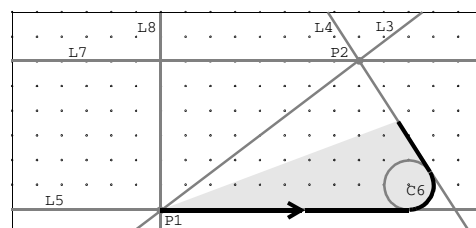


In both cases, it is possible to product complex, parameterized designs which allow the production of "endless" profiles, when the last element joins up with the first one, or "open-ended" profiles, when the last element does not join up with the first

"Endless" profile



"Open-ended" profile



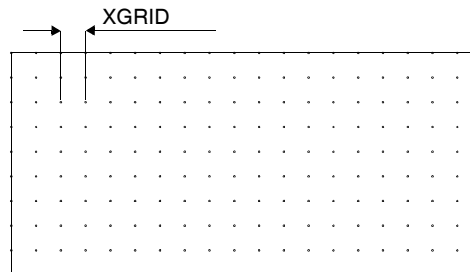
Each profile produced is saved and filed in the CAD library, and made available for programming routing.

## 6.2 CAD SETUP

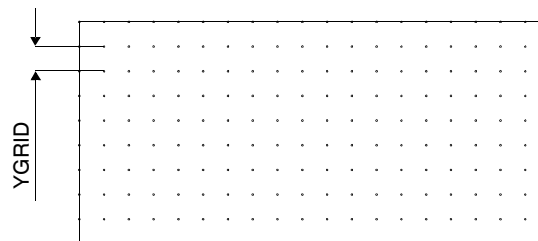
Allows the user to set the characteristics of the graphic area and the panel.

- 1) Select <Menu> and the <CAD Setup> option to access setting of the fields as described below.

<XGRID>: distance between points on the grid, in the X axis direction.



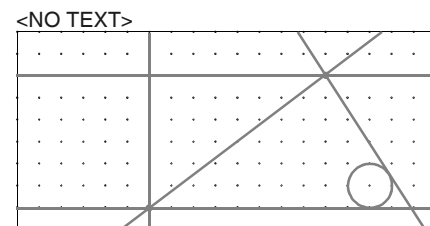
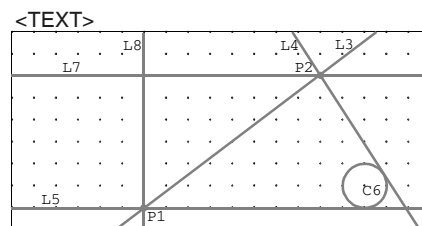
<YGRID>: distance between points on the grid, in the Y axis direction.



<DELTA>: number of grid points for rapid movement of the cursor, obtained by pressing SHIFT + one of the ARROW keys (UP, DOWN, RIGHT, LEFT).

<TEXT>: displays the labels of the base elements.

Select <TEXT> to display the labels or <NO TEXT> not to display the labels.



<MODIFY>: activates the "relationship bond" between the base elements, for automatic update during modification of one of their generator elements.

Select <MOD.ON> to activate the bond or <MOD.OFF> to deactivate the bond.

<RESIZE>: not usable.

<CONNECTION>: execution of connecting sections during shaping between elements which are not at a tangent to each other but which intersect at an angle smaller than the angle indicated in <ANGLE> below.

Select <CON\_YE> to create the links, <CON\_NO> not to create the links.

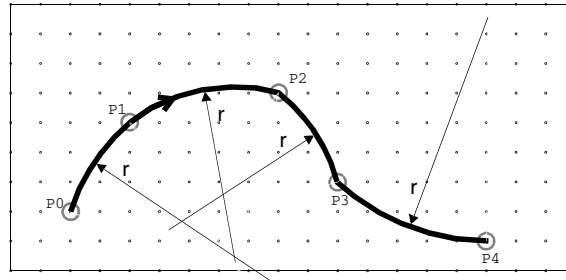
<EXTENSION>: extension to be used to define the type (format) of the file when saving.

Select <.PRF> to save the file as a profile, <.MCR> to save the file as a macro for routing



(with name MF\*.MCR: \*=number from 1 to 20), or <.DIS> to save the file as a design to be used during tooling of the work table.

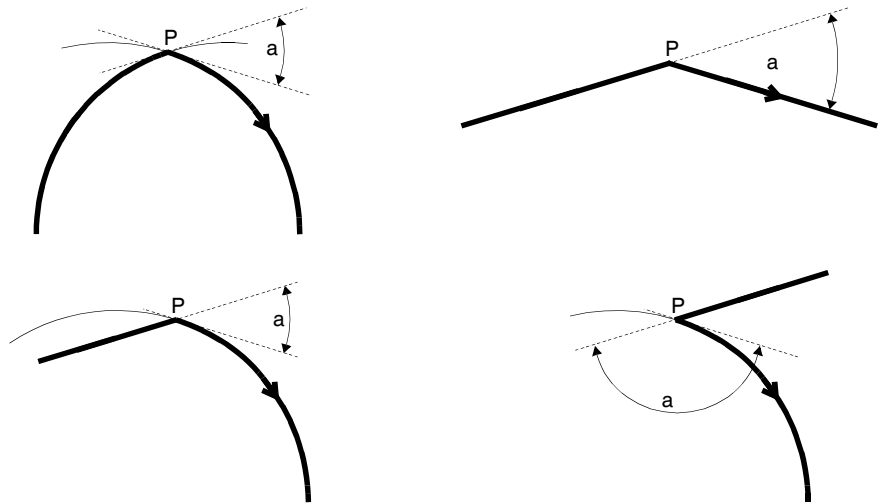
<**RADIUS**>: maximum permitted value for the radius ( $r$ ) of the arc (calculated automatically) which links two successive points, during creation of the profile by connecting up the points; if the radius of the arc which passes through the points exceeds this value, it is automatically replaced by a straight line.



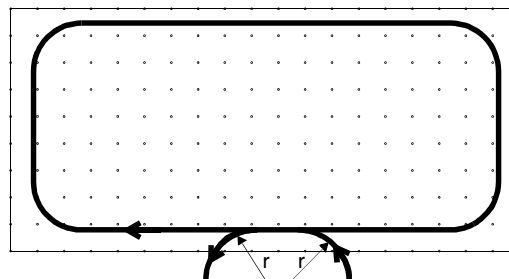
<**OFF X**>: not usable.

<**OFF Y**>: not usable.

<**ANGLE**>: value of the angle ( $a$ ) for the creation of connections (see <CONNECTIONS> above). If the angle formed by the two tangents in the point of intersection  $P$  is less than this value, the two elements are considered tangents.



<**RAD.INOUT**>: radius ( $r$ ) for the connecting section to be used during application of the entry and exit; this value must be appropriate to the dimensions of the profile and the radius of the tool to be used.



### 6.3 CREATING THE PANEL

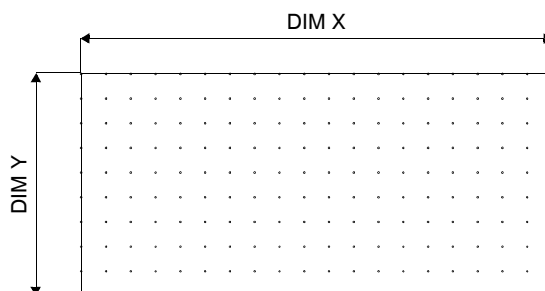
In the CAD, the "panel" is the main (reference) zone of the graphics area. Whenever the NC is switched on, it is possible to start drawing an unnamed file "noname00.PRF" on the panel. To change the dimensions of the panel, proceed as described below; otherwise perform the CAD setup and then create the base design.

- 1) Select the <Files> menu and the <New> option.
- 2) Press ENTER on the <Yes> field to access setting of the fields as follows.

<DIM X>: dimensions of the panel in the X axis direction.

<DIM Y>: dimensions of the panel in the Y axis direction.

<DIM Z>: not usable; dimensions of the panel in the Z axis direction.



- 3) Press ENTER on the <Ok> field to confirm the setting.

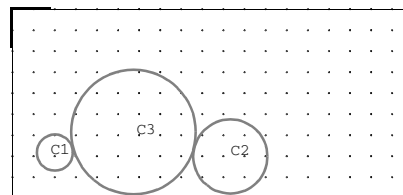
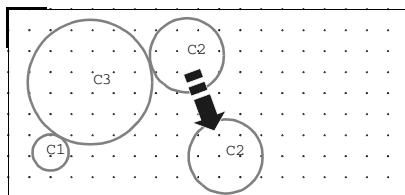
### 6.4 CREATING THE BASE DESIGN

The base elements which may make up the design are of three types: points, (straight) lines and circles. Before creating the design, users are advised to draft or analyze the profile to find out which and how many base elements will have to be drawn, and their respective coordinates and dimensions.

#### Relationship bond between the base elements

If an element is created using other elements already present in the design, a bond is established (the elements concerned are described as "relatives"). The bond is memorized and allows the user to transmit modifications from "parent" to "child" elements. To activate this function consult the description of the <MODIFY> field in "CAD SETUP" (page 6-2).

Example: create a circle C3 tangent to two circles C1 and C2 already drawn; when the position of C2 (a parent element) is modified, the position of C3 (child element) will also automatically be modified.



Each design may consist of up to a maximum of 100 base elements. Before starting the design, set the CAD as described in "CAD SETUP" (page 6-2). To draw base elements, proceed as follows.

- 1) Select <Menu> and the <Drawing> option.
- 2) Select the <Point> option to draw a "point" type element, <Line> to draw a "line" type element or <Circle> to draw a "circle" type element.
- 3) Select the command desired (the name appears under the last row of icons of the open popup) and press ENTER to access the setup function, as described in "DESCRIPTION OF DRAWING COMMANDS" (page 6-7). To set the parameters of the elements drawn, refer to "SETTING THE PARAMETERS OF THE BASE DESIGN" (page 6-5).
- 4) When the base design is complete, save it by selecting the <Files> menu and the <Save> option.
- 5) Type the name (maximum 8 characters) in the <File> field then press ENTER on <Ok>; a file with the extension set during the CAD setup will automatically be created.

## 6.5 SETTING THE PARAMETERS OF THE BASE DESIGN

In this process, the profile obtained from the base design is adapted to the dimensions of the program panel. This adaptation is carried out during routing programming, by setting the parameters present, and it may be of two types, "total" or "partial". In both cases, it may be necessary to define one or more conditions that must be complied with during application of the profile.

Using parameter setting with total adaptation, the profile can be applied to any panel with no need to set the parameters, but in accordance with the conditions present.

Using parameter setting with partial adaptation, the profile can be applied to any panel and the parameters can be set to vary the profile, although the conditions present must be complied with.

To set the parameters of a design, it is necessary to create parameters with associated values, which may also be the solution of an algebraic expression, and apply them during drawing of the base elements.

The parameters are created in the specific table accessed by selecting the "TabPar" menu. By default, the parameters table contains the main parameters relating to the dimensions of the panel (X=length, Y=width, Z=thickness). Each line of the table may contain just one parameter and consists of two fields; the user types the name on the left and the value or an algebraic expression on the right.

### Writing algebraic expressions

As well as the normal alphanumeric characters, the NC algebraic evaluator also accepts the calculation characters listed below:

- %(**x**) = calculation of the whole part of the "x" value;
- \$(**x**) = calculation of the sine of "x";
- @(**x**) = calculation of the cosine of "x";
- ^(**x**) = calculation of the square root of "x".

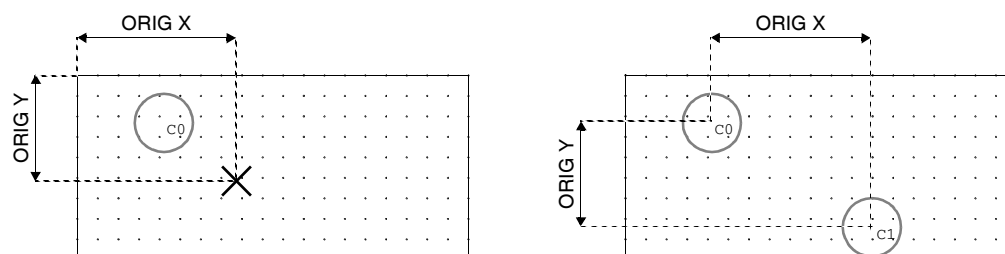
## 6.6 MODIFYING THE BASE DESIGN

In order to modify the base design, the individual elements which make it up must be modified as explained below:

- 1) Select the <ModEle> menu.
- 2) Select the element to be modified. Before making the modification, consult “«CAD» page procedures and information” (page 2-9); then modify the element. To modify the values of any parameters used to set the element, select the <ParTab> menu and vary the value of the parameter concerned.
- 3) Check that the effect obtained is as desired, then save the design by selecting the <Files> menu and the <Save> option.
- 4) Press ENTER on the <Ok> field to confirm saving with the same file name.

### 6.6.1 Copying base elements

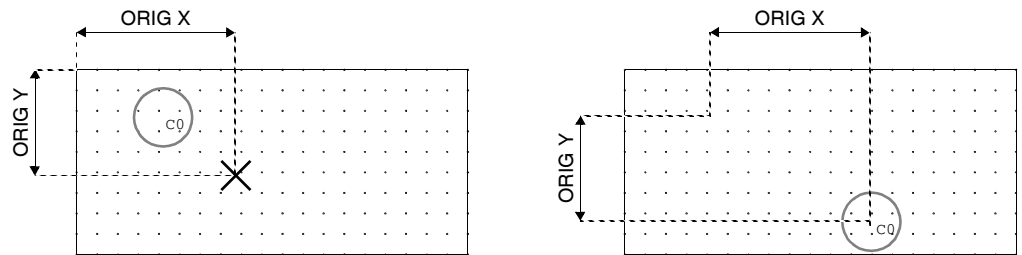
- 1) Select the <Menu> and then the <DrawingElement> option and <Copy elements>.
- 2) Select the elements to be copied and after completing the selection press the BS key.
- 3) Position the cursor, in relation to the panel point of origin, on the coordinates to be used for positioning the copied elements; the popup allows the coordinates to be modified. Press ENTER on the <Ok> field to confirm the operation.
- 4) The "copy" mode remains active, allowing other copies of the selected elements to be made. At the end of the operation, press ESC to exit from the mode.



### 6.6.2 Moving base elements

- 1) Select the <Menu> and then the <DrawingElement> option and <Move elements>.
- 2) Select the elements to be moved and after completing the selection press the BS key.
- 3) Position the cursor, in relation to the panel point of origin, on the coordinates to be used for moving the elements; the popup allows the coordinates to be modified. Press ENTER on the <Ok> field to confirm the operation.

- 4) The move mode remains active, allowing other copies of the selected elements to be made. At the end of the operation, press ESC to exit from the mode.



### 6.6.3 Deleting base elements

If elements used to create a profile are deleted, the profile is released from its bonds with the remaining elements and becomes independent, meaning that it will not be possible to make modifications to the profile by means of the base elements.

- 1) Select the <DelEle> menu and the elements to be deleted.
- 2) Press the BS key to delete the elements selected; the system also automatically exits from the deletion mode.

## 6.7 ROTATING THE BASE DESIGN

When this operation is carried out the original parameters are lost and everything which has been created in the graphic area of the CAD, including the profile, will be included in the rotation.

- 1) Select <Menu> then the <Drawing> option and <Rotate drawing>.
- 2) In the first popup which opens, set the coordinates of the central point of the rotation and press ENTER to confirm.
- 3) In the second popup which opens, set the angle for the rotation in the <ANGLE> field and press ENTER to confirm and activate the rotation procedure. The popup remains open for further settings of the rotation angle; to turn clockwise type a positive value, while to turn anti-clockwise type a negative value.
- 4) To exit from the rotation mode, press ESC.

## 6.8 DESCRIPTION OF DRAWING COMMANDS

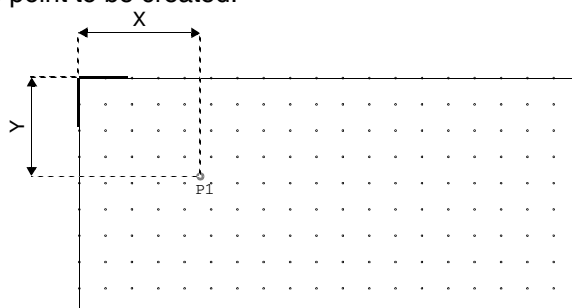
The following is a description of the commands available for drawing base elements.

### 6.8.1 <Point> command

The following are the commands available for creating a geometrical element of the "point" type.

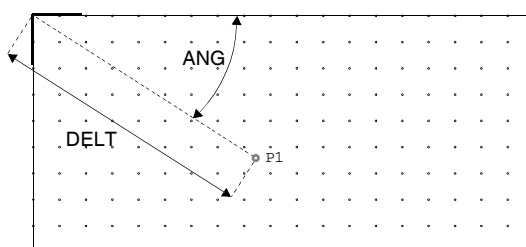
## &lt;Cartesian Co-ordinates&gt;

Creates a point by means of the grid or the cartesian coordinates. Select a point on the grid and press ENTER. The popup allows the user to modify the X and Y cartesian coordinates of the point to be created.



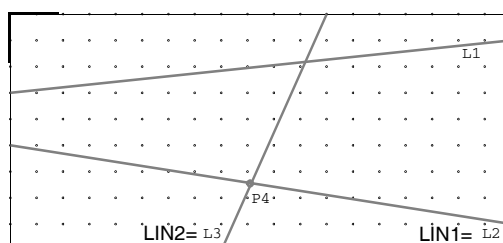
## &lt;Polar Co-ordinates&gt;

Creates a point by means of the polar coordinates. Select a point on the grid and press ENTER. The popup allows the user to modify the angle in relation to the X axis of the imaginary straight line on which the point to be created lies, and the distances from the point of origin of the cartesian axes.



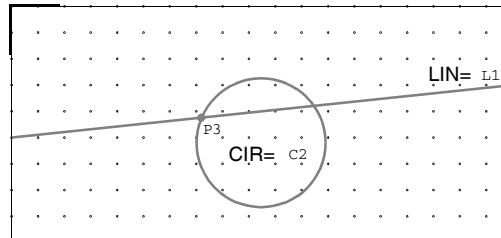
## &lt;Line-Line Intersection&gt;

Creates a point from the intersection of two lines. Select two lines (e.g. L1, L3) and press ENTER. The popup allows the user to modify the numbers of the labels of the elements (e.g.: first line = L2, second line = L3). The point created (e.g. P4) is the intersection of the two lines.

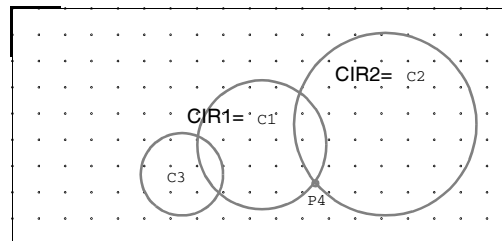


**<Line-Circle Intersection>**

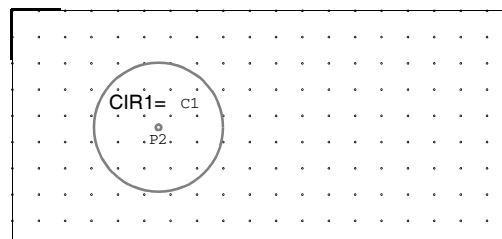
Creates a point from the intersection of a line with a circle. Select a line and a circle, then press ENTER. The popup allows the user to modify the numbers of the labels of the elements. If the line intersects the circle, the user must choose between the two alternatives. The point created (e.g. P3) is the intersection of the line and the circle.

**<Circle-Circle Intersect.>**

Creates a point from the intersection of two circles. Select two circles (e.g. C1, C3) and press ENTER. The popup allows the user to modify the numbers of the labels of the elements (e.g.: first circle = C1, second circle = C3). If the two circles intersect each other, the user must choose between the two alternatives. The point created (e.g. P4) is the intersection of the two circles.

**<Point centre circle>**

Creates a point at the centre of a circle. Select the circle and press ENTER. The popup allows the user to modify the numbers of the labels of the elements. The point created has the coordinates of the centre of the circle.

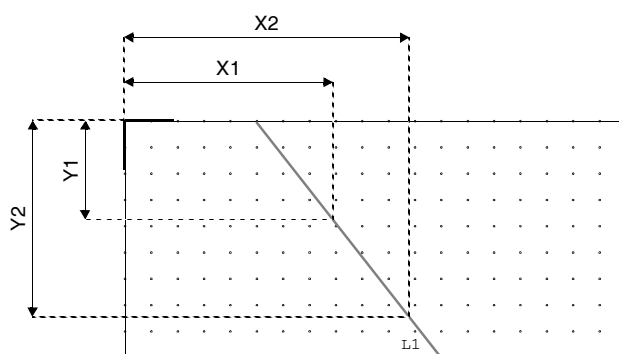


## 6.8.2 <Line> command

The following are the commands available for creating a geometrical element of the "line" type.

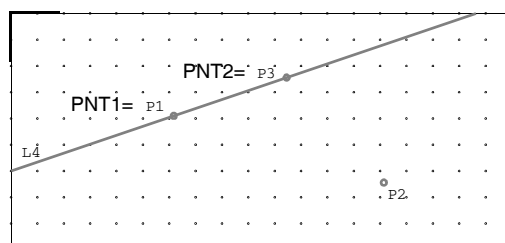
### <Through 2 pairs XY>

Creates a line passing through two points on the grid. Select two points of the grid through which the line to be created is to pass and press ENTER. The popup allows the user to modify the X and Y coordinates of the points through which the line passes.



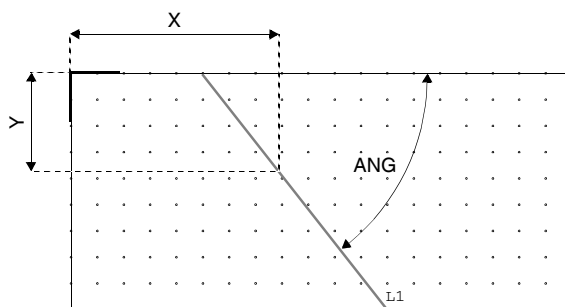
### <Through 2 known points>

Creates a line passing through two known points. Select two points (e.g. P1, P2) through which the line to be created is to pass and press ENTER. The popup allows the user to modify the numbers of the labels of the points through which the line passes (e.g.: first point = P1, second point = P3).



### <Through XY pair with ang>

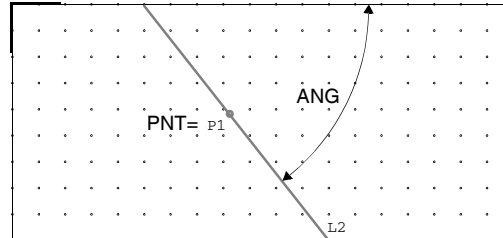
Creates a line passing through a point on the grid with an angle in relation to the X axis. Select a point of the grid through which the line to be created is to pass and press ENTER, then use the arrow keys to select the angle of the line and press ENTER. The popup allows the user to modify the X and Y coordinates of the point through which the line passes and its angle in relation to the X axis.



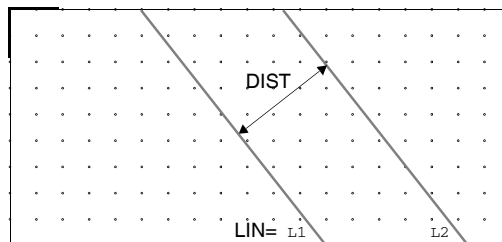


**<Through known pt. with an>**

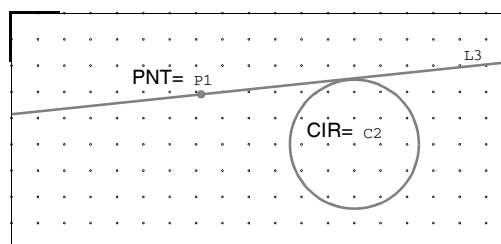
Creates a line passing through a known point with an angle in relation to the X axis. Select a point through which the line to be created is to pass and press ENTER, then use the arrow keys to select the angle of the line and press ENTER. The popup allows the user to modify the label number of the point through which the line passes and its angle in relation to the X axis.

**<Parallel known line>**

Creates a line parallel to a known line. Select the reference line for the parallel line to be created and press ENTER. The popup allows the user to modify the label number of the reference line and the distance between the two lines. Choose between the two alternatives.

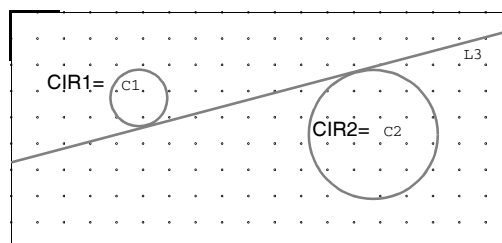
**<Circle tang through poin>**

Creates a line passing through a known point and tangent to a circle (the point must always be outside the circle). Select a known point through which the line is to pass and press ENTER, then select the circle to which the line to be created is to be tangent and press ENTER. The popup allows the user to modify the label number of the circle and the label number of the point. Choose between the two alternatives. The line obtained is tangent to the circle and passes through the point.

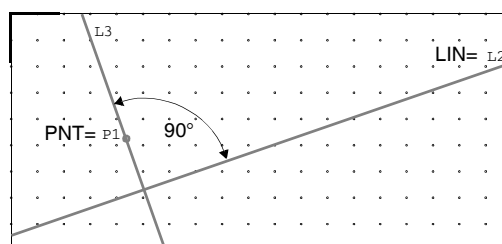


**<Tangent 2 known circles>**

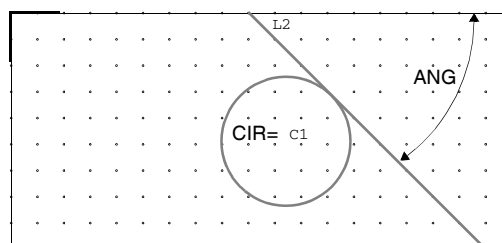
Creates a line tangent to two circles. Select the two circles and press ENTER. The popup allows the user to change the label numbers of the circles. In the most general case, the user has to choose between 4 alternatives. The line obtained is tangent to both circles.

**<Perp. line through point>**

Creates a line passing through a known point and perpendicular to a line. Select the point and the line, then press ENTER. The popup allows the user to change the label numbers of the line and the point. The line obtained is perpendicular to the chosen line and passes through the point.

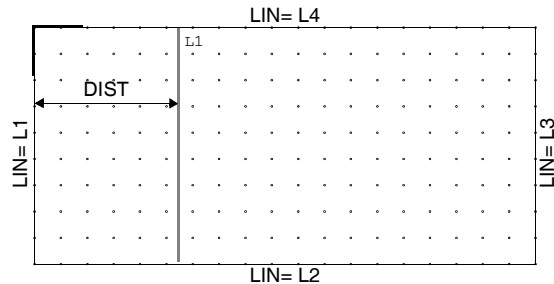
**<Circle tang. with angle>**

Creates a line tangent to a circle at a specified angle to the X axis. Select the circle and a point on the grid to establish the angle, then press ENTER. The popup allows the user to change the label numbers of the tangent circle and the angle of the line to be obtained. Choose between the two alternatives.



**<Parallel to an axis>**

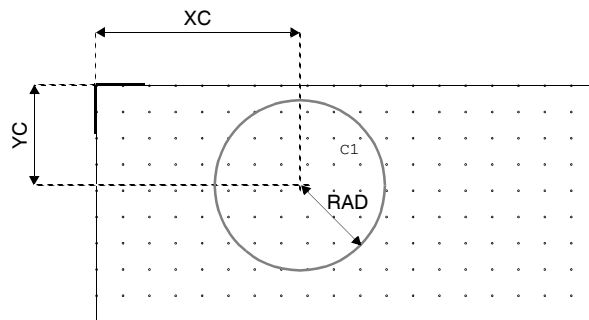
Creates a line parallel to one side of the profile panel (e.g. LINE = L1). Select the side and press ENTER. The popup allows the user to modify the distance between the line and the side of the panel.

**6.8.3 <Circle> Command**

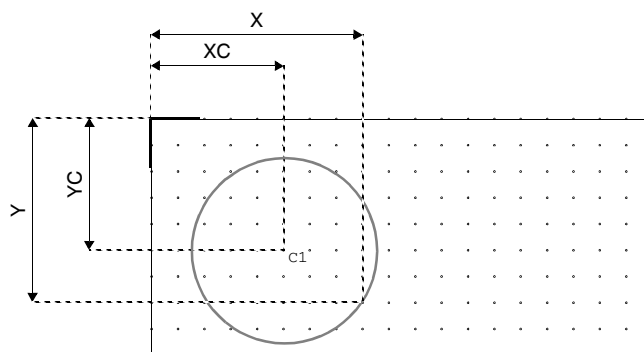
The following are the commands available for creating a geometrical element of the "circle" type.

**<By XY centre and radius>**

Creates a circle by means of the grid and the cartesian coordinates. Select a first point on the grid for the centre of the circle to be created and press ENTER; then a second point on the grid for the radius of the circle, and press ENTER. The popup allows the user to modify the X and Y coordinates of the centre and the value of the radius.

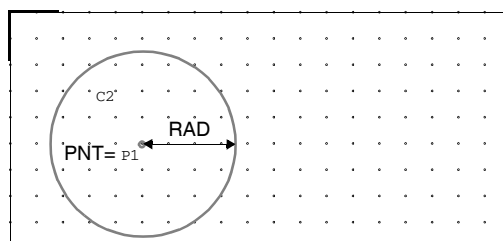
**<By XY centre XY point>**

Creates a circle by means of two points on the grid, the first for the centre of the grid and the second to indicate the passage of the circumference. Select the two points on the grid and press ENTER. The popup allows the user to modify the X and Y coordinates of the two points.



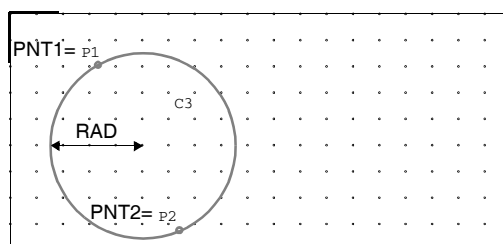
## &lt;By known centre radius&gt;

Creates a circle by means of a known point and a point on the grid, the former for the centre of the circle and the second for the radius. Select the two points on the grid and press ENTER. The popup allows the user to modify the label number of the known point and the value of the radius.



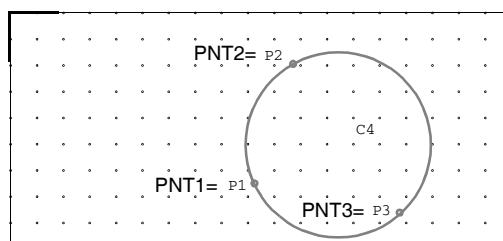
## &lt;By 2 known points radius&gt;

Creates a circle passing through two known points with known radius. Select the two known points and set the value of the radius approximately using a point on the grid, then press ENTER. The popup allows the user to modify the label numbers of the known points and the value of the radius. Choose between the two alternatives.



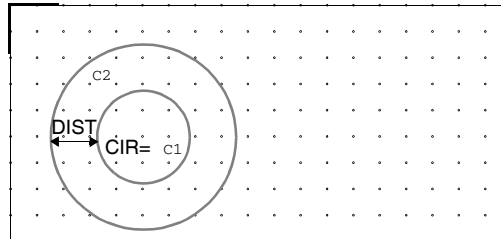
## &lt;By 3 known points&gt;

Creates a circle which passes through three known points. Select the three known points through which the circle is to pass and press ENTER. The popup allows the user to modify the label numbers of the known points.

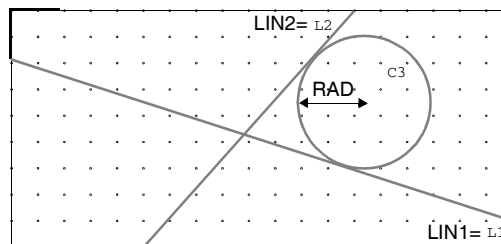


**<Concentric to circle>**

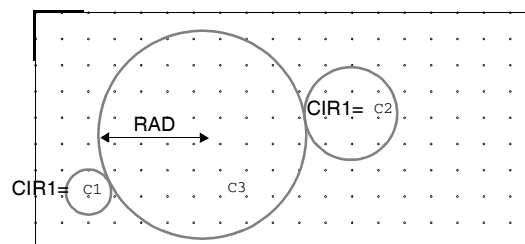
Creates a circle concentric to a known circle. Select the known circle and a point on the grid to set the difference between the two circumferences, then press ENTER. The popup allows the user to modify the label number of the circle and the distance between the circumferences. Choose between the two alternatives (inside or outside the known circle).

**<Tangent 2 known lines>**

Creates a circle at a tangent to two intersecting lines. Select the two lines and press ENTER. The popup allows the user to modify the label numbers of the elements and the radius of the circle. Choose between the 4 possible geometrical solutions. A circle at a tangent to the lines is obtained.

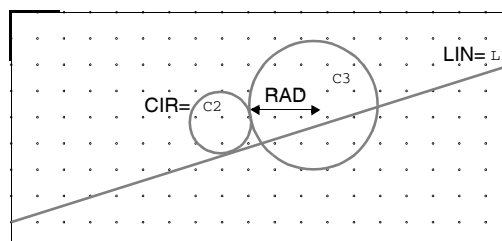
**<Tangent 2 known circles>**

Creates a circle at a tangent to two circles. Select the two circles and press ENTER. The popup allows the user to modify the label numbers of the elements and the radius of the circle to be created. In the most general case, there are 8 alternatives from which to choose. A circle at a tangent to the two circles is obtained (e.g. C3).

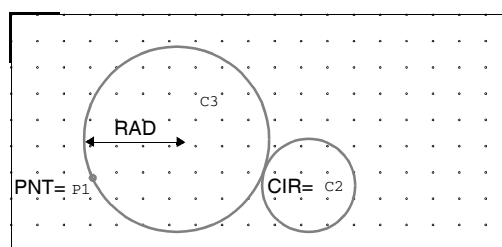


**<Circle line tangent>**

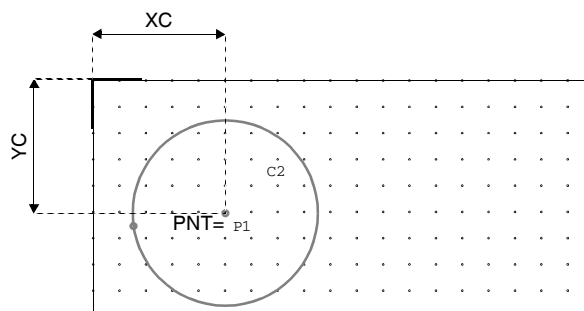
Creates a circle at a tangent to a line and a circle. Select the line and the circle and press ENTER. The popup allows the user to modify the label numbers of the elements and the radius of the circle to be created. In the most general case, there are 8 alternatives from which to choose. A circle at a tangent to the line and the circle is obtained (e.g. C3).

**<Tang circle through pnt>**

Creates a circle passing through a known point and at a tangent to a circle. Select a known point, the circle and a point on the grid for the radius of the circle to be created, then press ENTER. The popup allows the user to modify the label numbers of the elements and the radius of the circle. Choose between the two alternatives. The circle obtained passes through the known point and is at a tangent to the circle (e.g. C3).

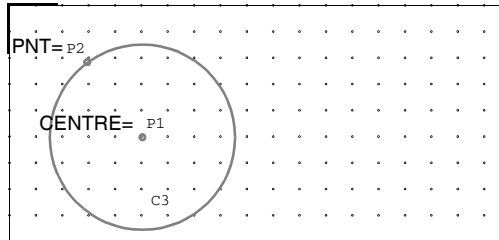
**<By pair XY and point>**

Creates a circle by means of a point on the grid and a known point, the former being the centre of the circle and the latter providing the radius. Select the two points and press ENTER. The popup allows the user to modify the coordinates of the centre of the circle and the label number of the known point.



**<By P1 centre and P2>**

Creates a circle by means of two known points, the first being the centre of the circle and the second providing the radius. Select the two known points and press ENTER. The popup allows the user to modify the label numbers of the known points.



## 6.9 CREATING A PROFILE BY TRACING OVER ELEMENTS

The profile must always start with a point and end with a point; the two may or may not coincide. It is not necessary to have a “point” type element on the design exactly where the profile starts. The user may exit from the procedure at any moment during creation of the profile by pressing ESC; when the procedure is re-accessed, creation of the profile restarts from the point where it was interrupted. To end the tracing process and obtain the profile, the user must establish the final point (finishing point of the profile); otherwise it cannot be saved. Before proceeding, refer to “«CAD» page procedures and information” (page 2-9).

To trace over the elements, proceed as follows.

- 1) Select <Menu> then the <Profile> option and <Add profile>.
- 2) Set the point where the tracing process is to start (starting point of the profile); there are two ways of doing this.

In the first method, the user must select a “point” type element, which must coincide with the base element which will allow the first element of the profile to be obtained.

In the second method, since it is not possible to select a “point” type element, the user selects another type of element, a “line” or a “circle”. A DARK BLUE line appears on the element selected, where the cursor is located; use the arrow keys to locate this line vertical or horizontal and press ENTER (the line becomes LIGHT BLUE). Use the arrow keys to move the line over the selected element (coloured WHITE) to establish the starting point of the tracing process (starting point of the profile) on the intersection of the two, and press ENTER. The open popup allows the user to modify the coordinates of the initial point, or he may simply confirm the operation by pressing ENTER on the <Ok> field.

- 3) After setting the initial point, trace over all the elements needed to create the profile. To eliminate the latest procedure carried out during tracing of a profile, refer to “Activating the UNDO function” (page 6-18).

Move the cursor to select the next element and press ENTER; the selected element is WHITE while the part of the profile already created is LIGHT BLUE. The only constraint when selecting the elements which follow is that they must intersect with the previous element. Whenever the element after the current one is selected, the system displays any multiple intersections, which may be displayed in sequence by pressing the arrow keys. Choose the alternative required by pressing ENTER. If there is only one intersection between the current element and the next, this is automatically taken as the final point of the previous segment or arc and the starting point of the current arc or segment. The

same applies when choosing the section of an arc to be traced over; the two paths are displayed in sequence by pressing the arrow keys. Press ENTER to choose the required path.

- 4) To end the tracing process, the user must set the tracing end point (final point of profile). If the point selected is the same as that used as starting point, the profile will be of "endless loop" type; otherwise, if it is a different point, the profile will be of "open-ended" type. There are three ways of setting the final point.

In the first method, press the BS key and select a "point" type element. This point is automatically taken as the end point of the profile.

In the second method, since it is not possible to select a "point" type element the user must press the BS key and then select a "line" or "circle" type element to finish the profile. If the element chosen is also the first one used during the tracing process, the user can automatically complete and close the profile by pressing the BS key again.

In the third method, select the last element and press the BS key. A DARK BLUE line appears where the cursor is located; use the arrow keys to locate this line vertical or horizontal and press ENTER (the line becomes LIGHT BLUE). Use the arrow keys to move the line over the selected element (coloured WHITE) to establish the finishing point of the tracing process (final point of the profile) on the intersection of the two, and press ENTER. The open popup allows the user to modify the coordinates of the finishing point, or he may simply confirm the operation by pressing ENTER on the <Ok> field.

- 5) When the tracing process is complete, save the profile obtained by selecting the <Files> menu and the <Save> option.
- 6) Type the name (maximum 8 characters) in the <File> field then press ENTER on <Ok>; a file with the extension set during the CAD setup will automatically be created. To save the file with the previous name, simply press ENTER on the <Ok> field.

### 6.9.1 Activating the UNDO function

The UNDO function allows the user, during creation of the profile, to cancel the last operation performed in sequence until the profile has been completely eliminated.

It can only be activated during creation of the profile, by pressing CTR + DEL or by selecting <Menu> and the <ProfileElement> and <Undo Profile Creation> options.

The option is disabled once the profile is finished.

## 6.10 CREATING THE PROFILE BY JOINING UP POINTS

The profile is calculated and created automatically on the basis of all the "point" type elements present in the base design. The direction of the profile is established by the sequential order in which the points have been drawn. To define the type of line used to join up the points, see description of the <RADIUS> field in "CAD SETUP" (page 6-2).

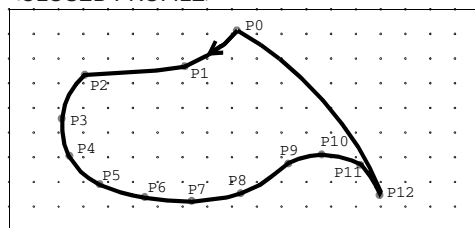
To join up the points, proceed as follows:

- 1) Select the <Menu> and the <Profile> option.
- 2) Select the <Profile utilities> option and <Profile by points>.

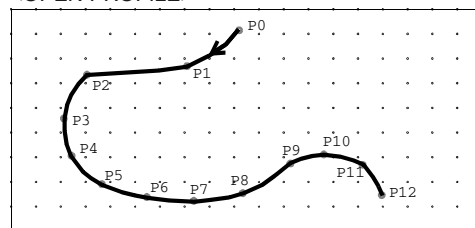


- 3) In the open popup, set the type of profile required, by selecting <CLOSED PROFILE> or <OPEN PROFILE>.

<CLOSED PROFILE>



<OPEN PROFILE>



- 4) When the process is complete, save the profile obtained by selecting the <Files> menu and the <Save> option.
- 5) Type the name (maximum 8 characters) in the <File> field then press ENTER on <Ok>; a file with the extension set during the CAD setup will automatically be created. To save the file with the previous name, simply press ENTER on the <Ok> field.

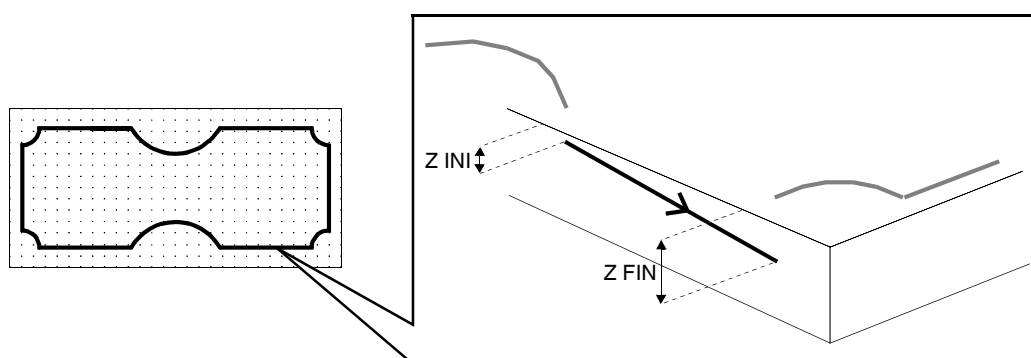
## 6.11 SETTING THE MACHINING DEPTH ON THE PROFILE

In this procedure, the user sets the depth of the starting point and finishing point of the elements which make up the profile, as described below.

- 1) Select <Menu> then the <ProfileElement> option and <Modify depth>.
- 2) If more than one profile is present, choose the one of interest.
- 3) Select the element of the profile on which the working depth is to be set and set the fields as described below. Repeat the setting procedure on the elements desired.

<Z INI>: depth of the initial point, in relation to the surface of the panel to be machined.

<Z FIN>: depth of the finishing point, in relation to the surface of the panel to be machined.



- 4) When the process is complete, press ESC to conclude the setting procedure and save the profile by selecting the <Files> menu and the <Save> option.
- 5) Type the name (maximum 8 characters) in the <File> field then press ENTER on <Ok>; a file with the extension set during the CAD setup will automatically be created. To save the file with the previous name, simply press ENTER on the <Ok> field.

## 6.12 HIGHLIGHTED DISPLAY OF PROFILE

This display mode conceals the base design and only shows the profile. This mode should only be activated once the profile has been completed, to allow the user to see clearly whether any errors have been made in the selection of elements during the tracing process. After this, return immediately to the complete display mode. If this is not done, whenever another profile (file) is opened, the display will be incomplete and the operator may become confused about the profile's real situation.

This display mode is activated by pressing CTRL + ESC or by selecting <Menu> and then the <DrawingElement> and <Hide/display drawing> options.

To return to full display, press CTRL + ESC.

# Chapter 7

## SOFTWARE FOR PC

### 7.1 GENERAL INFORMATION ABOUT THE SOFTWARE FOR PC

The software may be installed on a PC (personal computer) having the following characteristics:

- PC 486;
- Hard Disk 10 MB;
- Operating system Windows 95 - Windows 3.X.

### 7.2 INSTALLING THE SOFTWARE ON PC

The installation kit comprises:

- three diskettes for installing the software;
- one diskette for replacing the software language;
- one PROS, software protection key.



#### CAUTION

**To avoid causing problems to the PC setup and to ensure correct installation of the software, users are advised to have the instructions listed below followed by skilled technical staff.**

- 1) Switch off the PC.
- 2) Connect the PROS to the parallel port of the PC; if a printer is connected, remove the connection socket, insert the PROS in the PC and connect the printer to the PROS.
- 3) Switch on the PC.
- 4) Access Windows, insert the first installation diskette in drive a: of the PC and proceed as follows.

From Windows 95:

- select "Explorer"
- select drive a:
- run the file "install.pif"; a group with the same name as the machine, containing 3 programs available for running (CAD, Editor, Plav) is created. Exit from the programs by closing the window as for Windows.

From Windows 3.X:

- select "File Manager"
- select drive a:
- run the file "install.pif"; a group with the same name as the machine, containing 3 programs available for running (CAD, Editor, Plav) is created. Exit from the programs by closing the window as for Windows.

### 7.3 DESCRIPTION OF FUNCTIONS WITH PC KEYBOARD

The table which follows lists the functions which can be carried out using the PC keyboard.

ESC		aborts the operation
END	corresponds to the BS key of the NC	deletes the first character on the left of the cursor, in the fields which can be edited
F10		creates a *.BMP file of the page displayed; the files created are numbered in sequence and placed in the same Directory
F11	corresponds to the ARROW key of the NC	allows display of the second lines of the menus, and vice-versa
ALT+D		from the «CAD» page, deletes compensation of the profile
ALT+F		from the «CAD» page, deletes all the base elements present on the screen
ALT+N	corresponds to the CTRL+ESC combination of keys on the NC	from the «CAD» page, displays the profile only, concealing the base elements
ALT+P	corresponds to the SHIFT+F1 combination of keys on the NC	from the CAD page, directly opens the popup while the base elements are being drawn
ALT+Q		from the «CAD» page, deletes all the positions present on the video
ALT+R		from the «CAD» page, simultaneously deletes all the base elements, the profiles, the compensation and all the other data structures present on the screen
ALT+W		from the «CAD» page, deletes all the profiles present on the screen
CTRL+ARROW		from the «CAD» page, moves the cursor quickly through the points in the grid, with a "delta" step
CTRL+U	corresponds to the CTRL+DEL combination of keys of the NC	from the «CAD» page, annuls the last operation performed during creation of the profile, in sequence

### 7.4 TOOLING FROM PC

Users are advised not to carry out tooling directly from the PC, in order to avoid creating data different from those present on the machine. Make a copy (backup) of the NC tooling data on diskette so that they can be transferred to and copied on the PC.

# Chapter 8

## LIST OF ERRORS

### 8.1 USER INTERFACE ERRORS

#### Code “C” errors

**C1 - %d and %d NOT ADJAC.**

The two elements indicated are not contiguous; i.e. the last point of the previous element does not coincide with the first point of the following element. Check the precision of the profile again.

**C2 - Opening file**

A file opening operation has failed. The file might be damaged or not present.

**C3 - El. not adjacent**

Error on the profile, which has “gaps”; i.e. the last point of the previous element does not coincide with the first point of the following element.

**C4 - Calc profile direction**

The function which calculates the direction of the profile cuts out in error status. This is a special type of profile which the system is unable to process.

**C5 - ERROR Compens.**

Compensation error on the element corresponding to the number specified in the line below.

**C6 - NO PROFILE**

There are no profiles present.

**C7 - Bad connection****C8 - Connection dir**

Error in calculation of the connection.

**C9 - Parallel lines****C10 - Parallel arcs**

An error has occurred in calculation of the element parallel to the current element. This may be because the tool diameter is too large or the end points of an element have not been calculated accurately.

**C12 - Large tool diameter**

The tool diameter is too large and does not allow the compensation of some elements of the profile (e.g. circle with radius smaller than that of the tool).

**C11 - Line-Line connection****C13 - Line-Arc connection**

**C14 - Arc-Line connection****C15 - Arc-Arc connection**

Errors in the connection between two elements.

**C16 - Imposs NO CONNECT**

It is not possible to compensate this profile with the CONNECTION flag. Modify the value in the SETUP menu.

**C17 - Overlapping**

The compensated profile has parts which overlap, which may be because the profile is not correct, i.e. created with "loops" or having an incorrect diameter.

**C18 - Nil tool radius**

A compensation has been requested without specifying the tool radius.

**C19 - OUT OF MEMORY!**

The space available for saving profiles has been filled

**C20 - IN/OUT ERROR**

The entry/exit calculation routine has cut out in error status. If an overlap delta is present, it might be too large.

**C21 - BAD PROFILE**

The profile is not correct. See example described in errors C1 and C3.

**Code "E" errors****E1 - data damaged**

Incorrect data have been found while reading the file.

**E2 - TOO MANY BORINGS**

There are too many borings in the program or in the optimizer.

**E3 - MANY PROG.LINES**

There are too many lines in the program.

**E4 - TOO MANY PROFILES**

There are too many profiles in the program.

**E5 - TOO MANY EL. IN PROF**

There are too many elements in the profile.

**E6 - work list line error**

The user has requested execution of a list line with an error.

**E7 - name missing**

The user has attempted to write or save a file without giving it a name.

**E8 - program selected**

No program has been selected for execution.

**E9 - express.calc. error**

Error in calculation of an expression.

**E10 - boring type error**

A boring with incorrect data has been found.

**E11 - boring downstroke error**

Data not correct relating to a group of optimized borings.

**E12 - program too long**

Program with too many lines to allow its execution.

**E13 - machining error**

Error in the data which do not relate to a process present in the assisted editor on the line specified below. If the program contains jumps, the line indicated might not coincide with that of the assisted editor.

**E14 - spindle missing**

Check in the head setup whether the spindle used for this operation is present.

**E15 - mirror spindle missing**

Check in the head setup whether the spindle symmetrical to the spindle used for this operation is present.

**E16 - spindle bit missing**

No bit on the spindle.

**E17 - mirror bit missing**

No bit on the SYMMETRICAL spindle.

**E18 - spindle dir error**

Discrepancy between the machining plane and the spindle axis.

**E19 - boring side error**

Boring with error in the data relating to the side.

**E20 - mir.spind. axis error**

Data relating to the axis of the symmetrical spindle not correct.

**E21 - boring corner error**

Boring with error in the data relating to the edge.

**E22 - tangent calc. error**

Error in calculation of the tangencies between contiguous elements; increase the tolerance angle.

**E23 - compensation error**

An error has occurred during compensation.

**E24 - min+max spds. mismatch**

The rotation speeds are incongruent. The minimum is > the maximum or vice-versa.

Check the data relating to the point, the router and the aggregate, if any aggregate is used for SYMMETRICAL ROUTING.

**E25 - nil speeds**

The entry and/or interpolation speed relating to the process are equal to zero. Check the data entered for the processing and analog speeds in the machine data.

**E26 - router axis error**

Error on the router axis.

**E27 - mir.router axis error**

Error on the symmetrical router axis.

**E28 - rotat. speed mismatch**

The router bit rotation speed and that of any aggregate are incongruous.

**E29 - bit missing**

The bit of the spindle or router requested is missing.

**E30 - mirror router missing**

There is no symmetrical router present.

**E31 - mirror aggreg. missing**

There is no symmetrical slot in the aggregate fitted with the bit requested.

**E32 - mirror agg.bit missing**

There is no bit fitted on the symmetrical aggregate

**E33 - origin disabled**

The point of origin specified in the program data has not been activated.

**E34 - side or corner error**

The data relating to the boring side or edge are not correct.

**E35 - out of SW range Y**

In order to produce the boring, the spindle bit used goes beyond the sw limits of the Y axis;  
see the relative axis data.

**E36 - out of SW range Z**

In order to produce the boring, the spindle bit used goes beyond the sw limits of the Z axis;  
see the relative axis data.

**E37 - optimisation error**

A boring optimizer error has occurred.

**E38 - bad password**

In order to access this function, the user must enter the password in the maintenance page.

**E39 - err saving axes data**

The axis data have not been changed. Perhaps the machine is not in the correct conditions for saving of new parameters - switch it to manual or emergency status.

**E40 - TOO MANY ORIGINS**

There are too many points of origin in the data file.

**E41 - TOO MANY SPINDLEBIT**

There are too many spindle bits in the data file.

**E42 - TOO MANY ROUTERBITS**

There are too many ROUTER bits in the data file.

**E43 - unchanged drw miss.**

- 1) The design associated to the profile has been deleted, so the profile cannot be modified by changing its parameters.
- 2) Operations have been performed on the profile which mean it can no longer be modified.

**E44- in error**

An error has occurred during input of the entry.

**E45 - out error**

An error has occurred during input of the exit.

**E46 - label missing**

The program or list contains a jump to a label not present.

**E47 - work list line error**

This list line cannot be executed.

**E48 - assigned inst. error**

Error in the assignment instruction.

**E49 - assigned div by 0**

Division by zero in the assignment instruction



**E50 - IF instr. error**

Error in the if .... instruction

**E51 - fill error**

Error in the instruction for filling the profile with parallel lines

**E52 - axes interp. speed = 0**

Check the value relating to the axis interpolation speed in the axis parameter page.

**E53 - axes interp. acc = 0**

Check the value relating to the axis interpolation acceleration in the axis parameter page.

**E54 - lookahead error**

The profile for which the working speeds have to be calculated has an incorrect number of elements or its speeds are too low for the profile execution.

**E55 - tool length error**

Tool length = 0.

**E56 - in on lines**

The 3D\_CA entry can only be placed on lines parallel to the coordinate axes, and those of the 3D\_LA only on lines.

**E57 - out on lines**

The 3D\_CA exit can only be placed on lines parallel to the coordinate axes, and those of the 3D\_LA only on lines.

**Code "G" errors****G0 - End available elem**

The elements available for the profiles have run out.

**G1 - NIL Length segment****G2 - NIL Length arc****G3 - NIL elements**

Elements of length nil have been inserted in the profile. The program deletes them automatically.

**G4 - DEFAULT elements**

After modifications to the design an element previously linked to other elements of the design has been separated from them and has become of DEFAULT type.

**G5 - Profile NOT MODIFIED**

The modifications on the base design or the choice of parameters is incorrect, so the profile cannot be obtained from the new design. Reload the file and insert correct values in the parameters.

**G6 - Profile NOT UPDATED**

Same as G5.

**G7 - End prof number**

The profiles available have run out.

**G8 - End DRAWING elem**

The basic geometrical elements available for the construction of profiles have run out.

**G9 - End PROFILES**

The profiles available have run out.

**G10 - DRW CREATE ERROR**

An error has occurred in the geometric design, probably due to choice of a solution which generates an element a long way outside the panel.

**G11 - CLOSED Profile**

The user requests an operation only possible on open-ended profiles on a profile which is actually endless.

**G12 - Delta NOT added**

An error has occurred in the delta between entry and exit. Try reducing the value of the delta or entering on another element. Check that the profile is endless.

**G13 - Profile NOT OK**

The profile chosen is not suitable for the operation requested. For example, the user requests creation of a connecting link on a profile not related to geometry.

**G14 - OPEN PROFILE!!**

The user requests an operation only possible on endless loop profiles on a profile which is actually open-ended.

**G15 - FILLING PROFILE**

Error in the fill calculation routine; check the parameters given to the FILL.

**G16 - NON EXISTING ELEMENT**

The geometrical element chosen does not exist; check the label.

**G17 - IN - OUT**

The entry/exit routine has ended with an error.

**G18 - SAVING DRAWING**

The program is unable to save on disk because of lack of dynamic memory. Free a little RAM memory.

**G19 - DELTA TOO LARGE**

An error has occurred in the delta between entry and exit. Try reducing the value of the delta or entering on another element.

**G20 - ELEMENT type ERROR**

The element chosen is not correct. Check the label entered.

**G21 - Select prof beginning**

The profile starting point has not been chosen correctly.

**G22 - Only elem accepted \*\*\*POINT !\*\*\***

Only point type elements are accepted in the function which creates profiles by joining up points.

**G23 - Non existing profile**

The profile does not exist in the memory.

**G24 - Duplicated parameters**

It is not possible to copy two profiles using the same parameters on a single panel, or to copy the same profile.

**G25 - Too many param.**

Too many parameters have been entered (error in copying, when the parameters of the profile to be copied no longer fit into the table of the original profile).

**G26 - Nil Fill distance**

The FILL distance parameter is incorrect; enter a value other than 0.

**G27 - profile not present**

The profile is not present in the memory.

**G28 - Not enough points**

The number of points entered for the Profile Through Points routine is insufficient (there must be at least 3 points).

**G29 - Bad profile nb.**

The profile with this number is not present in the memory.

**Code “M” errors****M1 - Lines do not exist !..**

The lines indicated in the POPUP do not exist.

**M2 - One line does not exist! ...**

One line indicated in the POPUP does not exist.

**M3 - Lines are parallel!**

The lines chosen must intersect.

**M4 - Insert 2 diff. points !**

The two points must not coincide.

**M5 - 1st point does not exist!**

The point does not exist on the design: check the label.

**M6 - 2nd point does not exist!**

The point does not exist on the design: check the label.

**M7 - 3rd point does not exist!**

The point does not exist on the design: check the label.

**M8 - Ins. values diff.from 0!**

Enter at least one value different from 0.

**M9 - Point does not exist!**

The point does not exist on the design: check the label.

**M10 - Line does not exist!**

The line does not exist on the design: check the label.

**M11 - Circum. does not exist**

The circumference does not exist on the design: check the label.

**M12 - No element added!****M13 - No more elem. available**

There is no more room in the memory for geometrical elements.

**M14 - Drawing creation ERROR**

An error has occurred in the geometric design, probably due to choice of a solution which generates an element a long way outside the panel.

**M15 - No more prof. available !**

There is no more room in the memory for profiles.

**M16 - Circle does not exist**

The circumference does not exist on the design: check the label.

**M17 - Line external to circle**

The straight line does not intersect with the circle.

**M18 - Line does not exist**

The line does not exist on the design: check the label.

- M19 - 2nd circle does not exist**  
The circumference does not exist on the design: check the label.
- M20 - 1st circle does not exist**  
The circumference does not exist on the design: check the label.
- M21 - Circles not secant**  
The circles do not intersect.
- M22 - Infinite intersections**  
The circles coincide or are concentric.
- M23 - No intersection**  
The circles are external.
- M24 - Pt. intr. to circum.**  
The point is inside the circumference: there is no geometrical solution.
- M25 - Coinciding circles**  
The circles are coincident.
- M26 - Secant circles: SOL 3 & 4**  
Choose one of the two solutions proposed.
- M27 - Insufficient radius**  
Increase the value of the radius or change the geometrical solution.
- M28 - Circ. with negative rad.**  
The radius of the concentric circle is negative: vary the delta value.
- M29 - Parallel lines**  
The straight lines must intersect.
- M30 - Inadequate radius**  
Vary the value of the radius or change the geometrical solution.
- M31 - Circle non-existent SOL**  
Vary the value of the radius or change the geometrical solution.
- M32 - Infinite solutions !**  
The geometrical elements concerned do not intersect.
- M33 - Radius too small**  
Vary the value of the radius or change geometrical solution.
- M34 - Radius too large**  
Vary the value of the radius or change geometrical solution.
- M35 - Valid SOL : 4 and 8**  
Choose one of the two solutions proposed.
- M36 - ERROR modified drawing**  
The modification requested overturns the bonds between the elements of the designs.
- M37 - Element NOT on profile**  
Error displayed during creation of the profile if the user chooses a point which actually does not belong to the profile element as starting or finishing point.
- M38 - Route! Profile end**  
Error given during creation of the profile if the user chooses a point which actually does not belong to the profile element as starting or finishing point.
- M39 - Enter FIRST POINT**  
The first point of the profile has not been entered! Restart from the beginning.

**M40 - Select. not unique! (lin)**

The straight lines must intersect.

**M41 - 1st line does not exist !****M42 - 2nd line does not exist !**

The line does not exist on the design: check the label.

**M43 - Round: parallel lines**

The straight lines must intersect.

**M44 - Round: coinciding lines**

The straight lines must intersect.

**M45 - Non adjacent elements**

The elements of the profile to be connected and/or rounded must be consecutive and must intersect.

**M46 - ROUNDING error**

Error in rounding: check the distance set.

**M47 - Select. not unique! (cer)****M48 - 1st elem. does not exist****M49 - 2nd elem. does not exist**

The element chosen is not correct. Check the label entered.

**M50 - Connline:external elem**

The elements of the profile to be connected and/or rounded must be consecutive and must intersect.

**M51 - CONNECTION error**

Error in connection: check the radius set.

**M52 - POINT OUT OF PROFILE**

The point selected does not lie on the profile: check the coordinates.

**M53 - Cannot save data**

The data saving directory does not exist or the RAM memory is not sufficient.

**M54 - NO PROFILE**

No suitable profile exists.

**Code “U” errors****U1 - file copy failed****U2 - table full**

Data on file corrupted.

**U3 - long expression**

Data on file corrupted.

**U4 - wrong KEYWORD**

Data on file corrupted.

**U5 - bad comment**

An incorrect comment has been found. The data on file might be corrupted.

**U6 - corrupted data on file**

**U7 - bad string**

An incorrect string has been found. The data on file might be corrupted.

**U8 - bad symbol**

An incorrect string has been found on the data file. The data on file might be corrupted.

**U9 - Error on file**

Data on file corrupted.

**U10 - syntax error**

The expression contains a syntax error found by the expression evaluator.

**U11 - parenth missing**

Brackets missing in the expression.

**U12 - express missing**

The symbol to be evaluated is without a name.

**U13 - division by 0**

Calculation of the expression contains a division by zero.

**U14 - unknown parameter**

The user is using parameters not defined previously and so cannot be used to calculate another expression.

**U15 - parameter present**

The user wishes to enter a parameter with name identical to that of an existing parameter.

**U16 - '.' not permitted**

The full stop is not a permitted character.

**U17 - not enough memory****U18 - error opening file**

The file sought is not present in the memory

**U19 - error writing file****U20 - error reading file****U21 - flash writing error****U22 - flash deleting error****U23 - cannot be modified**

The user wishes to eliminate or modify a parameter used in the program.

**U24 - root less than 0**

The user is trying to calculate the square root of a number smaller than 0.

## 8.2 MACHINE INTERFACE ERRORS (PLC)

### Err 1-Non reset machine

Attempt to run a program with the machine not zeroed. Press Stop and reset, execute zeroing and repeat.

### Err 2-Manual reset impossible

Error not used at the moment.

### Err 3-Machine In Emergency

Machine in emergency. Initial state at starting or after an emergency. Put it in green and press Stop and Reset to restart.

### Err 4-X Axis drive KO

Axis operation not OK. This error may appear at the starting of the machine or due to malfunction while the machine is active. Causes the emergency status. Check the error on the operation display and resolve it.

### Err 5-Y Axis drive KO

Axis operation not OK. This error may appear at the starting of the machine or due to malfunction while the machine is active. Causes the emergency status. Check the error on the operation display and resolve it.

### Err 6-Z Axis drive KO

Axis operation not OK. This error may appear at the starting of the machine or due to malfunction while the machine is active. Causes the emergency status. Check the error on the operation display and resolve it.

### Err 7-Pressure drop insufficient

The vacuum system for the piece clamping is not sufficient. The start of the machine will not be enabled. The error will also be signalled by the illumination of the red light on the electric cabinet.

### Err 8-Non reset axes

Error not used at the moment.

### Err 9-Press Stop+Reset

Requested operation not allowed, Warning message.

### Err 10-Press Stop+Reset

Requested operation not allowed, Warning message.

### Err 11-Length Panel = 0

The program being executed has a dimension in X = 0. This is not allowed. Change the dimensions of the panel.

### Err 12-Acceleration Axis = 0

Acceleration machine data = 0. This is not allowed. Change the machine data.

### Err 13-No Change Parameters Active Axes

It is not possible to change the axis parameters when they are active. Press Stop and Reset and try again.

### Err 14-Axis X beyond Software Limitsw.

The axis has been commanded to move beyond the software limit switch. Check the program and try again.

### Err 15-Axis Y beyond Software Limitsw.

The axis has been commanded to move beyond the software limit switch. Check the program and try again.

**Err 16-Axis Z beyond Software Limitsw.**

The axis has been commanded to move beyond the software limit switch. Check the program and try again.

**Err 17-Axis C beyond Software Limitsw.**

The axis has been commanded to move beyond the software limit switch. Check the program and try again.

**Err 18-Encoder check routine KO**

Control routine on encoder. Turn the machine off and then on again and re-zero.

**Err 19-Not saved Axes Parameters**

The saving of the axis data has given a negative result. Contact the BIESSE Service Department.

**Err 20-Slot A Micro Up and Down ON**

Both the micros of Slot A are excited. This condition is not possible. One of the two micros is probably broken.

**Err 21-Slot A up cmd-no movement**

Slot A has been commanded to ascend, but it doesn't move. Check if there are any mechanical impediments which are blocking the movement. Check if there are any solenoid valves which have been changed over manually. Check that the command reel of the solenoid valve works. Check that the command reel of the solenoid valve is receiving tension. Check that the PLC output for the ascent command is ON. Check that the PLC output for the descent command is OFF.

**Err 22-Slot A up cmd-no arrival**

Slot A moved up but it doesn't hit the micro which signals that it is in the up position. Check if there are any mechanical impediments which are blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

**Err 23-Slot A down cmd-no movement**

Slot A has been commanded to descend, but it doesn't move. Check if there are any mechanical impediments which are blocking the movement. Check if there are any solenoid valves which have been changed over manually. Check that the command reel of the solenoid valve works. Check that the command reel of the solenoid valve is receiving tension. Check that the PLC output for the descent command is ON. Check that the PLC output for the ascent command is OFF.

**Err 24-Slot A down cmd-no arrival**

Slot A moved down but it doesn't hit the micro which signals that it is in the down position. Check if there are any mechanical impediments which are blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

**Err 25-Slot B Micro Up and Down ON**

Both the micros of Slot B are excited. This condition is not possible. One of the two micros is probably broken.

**Err 26-Slot B up cmd-no movement**

Slot B has been commanded to ascend, but it doesn't move. Check if there are any mechanical impediments which are blocking the movement. Check if there are any solenoid valves which have been changed over manually. Check that the command reel of the solenoid valve works. Check that the command reel of the solenoid valve is receiving tension. Check that the PLC output for the ascent command is ON. Check that the exit from the PLC for the descent command is OFF.

**Err 27-Slot B up cmd-no arrival**

Slot B moved up but it doesn't hit the micro which signals that it is in the up position. Check



if there are any mechanical impediments which are blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

#### **Err 28-Slot B down cmd-no movement**

Slot B has been commanded to descend, but it doesn't move. Check if there are any mechanical impediments which are blocking the movement. Check if there are any solenoid valves which have been changed over manually. Check that the command bobbin of the solenoid valve works. Check that the command bobbin of the solenoid valve is receiving tension. Check that the PLC output for the descent command is ON. Check that the PLC output for the ascent command is OFF.

#### **Err 29-Slot B down cmd-no arrival**

Slot B moved down but it doesn't hit the micro which signals that it is in the down position. Check if there are any mechanical impediments which are blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

#### **Err 30-Failed Inverter Transmission (Inverter)**

The control is not able to communicate with the Inverter. Check that the Inverter is on. Check that the Inverter number relative to the machine data of the head configuration is equal to the number set on the Inverter. Check that the Inverter parameters are correct. Check that the Inverter qualification exit is ON. Check the electric cables of the Inverter and the control.

#### **Err 31-Out Range Router Rotation**

The speed of the routing machine exceeds the 10% tolerance.

#### **Err 32-Sys err Inverter No Init**

System error. Stop and retry.

#### **Err 33-Expired Time Wait Inv. Regime**

The routing machine doesn't reach the requested rotation speed. The machine stops.

#### **Err 34-Bands Micro Up and Down ON**

The microswitches of the bands are actuated. This condition is not possible. One of the two micros is probably broken.

#### **Err 35-Bands up cmd no start**

A command to raise the bands has been issued, but the bands do not move. Check if there are any mechanical impediments which are blocking the movement. Check if there are any solenoid valves which have been changed over manually. Check that the command reel of the solenoid valve works. Check that the command reel of the solenoid valve is receiving tension. Check that the PLC output for the ascent command is ON. Check that the exit from the PLC for the descent command is OFF.

#### **Err 36-Bands up cmd no arrival**

Bands moved up but it doesn't hit the micro which signals that they are in the up position. Check if there are any mechanical impediments which are blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

#### **Err 37-Bands down cmd-no start**

A command to low the bands has been issued, but the bands do not move. Check if there are any mechanical impediments which are blocking the movement. Check that the command bobbin of the solenoid valve works. Check that the command bobbin of the solenoid valve is receiving tension. Check that the PLC output for the descent command is ON. Check that the PLC output for the ascent command is OFF.

#### **Err 38-Bands down cmd-no arrival**

The bands have moved downwards, but the microswitch signalling their down position does not provide the signal. Check if there are any mechanical impediments which are

blocking the movement. Check that the position micro works. Check that the input related to the micro is ON.

**Err 40-Drill-bit thick< Working depth**

**Err 41-Entry sp.=0 (1m/min set)**

**Err 42-Interp.Sp.=0(1m/min set)**

**Err 43-L-H Drill-bit on R-H Spindle**

**Err 44-R-H Drill-bit on L-H Spindle**

**Err 45-Inverter Acc. Ramp = 0 Def 5.0**

**Err 46-Inverter Decel. Ramp = 0 Def 5.0**

**Err 47 - Bad tool holder number**

A tool holder number higher than those permitted by the machine has been requested. Check the machine data of the tool holder.

**Err 50 - Mach TH mag up-2 Micro ON**

The tool raising microswitches of the magazine selected are both ON, one of them short-circuited.

**Err 51- Mach TH mag down cmd-no start**

Descent of a tool holder has been commanded but it does not move. Check that there are no mechanical impediments. Check that there are no solenoid valves switched by hand. Check that the lowering coil is receiving power. Check that the PLC lowering output is ON. Check that the PLC raising output is OFF.

**Err 52 - Mach TH mag down cmd-no arrival**

Descent of a tool holder has been commanded but the low position microswitch signal is not received. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 53 - Mach TH mag up cmd-no start**

A tool holder has been commanded to rise but does not move. Check that there are no solenoid valves switched by hand. Check that the lifting coil is receiving power. Check that the PLC raising output is ON. Check that the PLC lowering output is OFF.

**Err 54 - Mach TH mag up cmd-no arrival**

A tool holder has been commanded to rise but the rest position microswitch signal is not received. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 55 - Mach mag opening -2 Micro ON**

The opening microswitches of the selected magazine are both ON, one of them short-circuited.

**Err 56 - Mach mag close cmd-no start**

The magazine has been commanded to close but does not move. Check that there are no

solenoid valves switched by hand. Check that the closing coil is receiving power. Check that the PLC closing output is ON. Check that the PLC opening output is OFF.

**Err 57 - Mach mag close cmd-no arrival**

The magazine has been commanded to close but does not arrive. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 58 - Mach mag open cmd-no start**

The magazine has been commanded to open but does not move. Check that there are no solenoid valves switched by hand. Check that the closing coil is receiving power. Check that the PLC opening output is ON. Check that the PLC closing output is OFF.

**Err 59 - Mach mag open cmd-no arrival**

The magazine has been commanded to open but does not arrive. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 60 - Carr TH mag up-2 Micro ON**

The tool raising microswitches of the magazine selected are both ON, one of them short-circuited.

**Err 61- Carr TH mag down cmd-no start**

Descent of a tool holder has been commanded but it does not move. Check that there are no mechanical impediments. Check that there are no solenoid valves switched by hand. Check that the lowering coil is receiving power. Check that the PLC lowering output is ON. Check that the PLC raising output is OFF.

**Err 62 - Carr TH mag down cmd-no arrival**

Descent of a tool holder has been commanded but the low position microswitch signal is not received. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 63 - Carr TH mag up cmd-no start**

A tool holder has been commanded to rise but does not move. Check that there are no solenoid valves switched by hand. Check that the lifting coil is receiving power. Check that the PLC raising output is ON. Check that the PLC lowering output is OFF.

**Err 64 - Carr TH mag up cmd-no arrival**

A tool holder has been commanded to rise but the rest position microswitch signal is not received. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 65 - Carr cyl magazine-2 Micro ON**

One of the cylinders which rotates the magazine on the carriage has both microswitches ON. One of the two has short-circuited.

**Err 66 - Carr mag rotation cmd-no start**

Rotation of the carriage magazine has been commanded but it does not start. Check that there are no mechanical impediments. Check that there are no solenoid valves switched by hand. Check that the coil is receiving power. Check the PLC outputs.

**Err 67 - Carr mag rotation cmd-no arrival**

Rotation of the carriage magazine has been commanded but it does not arrive. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON.

**Err 70 - Warning Manual Lubrication**

Warning that machine components require lubrication for machines with manual lubrication.

**Err 71 - Warning Lub1 Lubric.Lacking**

Warning that the lubricant in the automatic lubrication system has run out.

**Err 72 - Autom.Lub.Cycle Error**

The command for the automatic lubrication cycle has been given, but it has not been completed. Check using the manual cycle button.

**Err 73 - Sys Err****Err 74 - Sys Err****Err 75 - Sys Err****Err 76 - Sys Err****Err 77 - Mach mag opening -2 Micro ON**

The opening microswitch of the magazine selected are both ON, one of them short-circuited.

**Err 78 - Carr mag close cmd-no start**

The magazine has been commanded to close but does not move. Check that there are no mechanical impediments. Check that there are no solenoid valves switched by hand. Check that the closing coil is receiving power. Check that the PLC closing output is ON. Check that the PLC opening output is OFF.

**Err 79 - Carr mag close cmd-no arrival**

Closure of the magazine has been commanded but it does not arrive. Check that there are no mechanical impediments. Check that the position microswitch is not broken. Check the position of the microswitch. Check that the input to the relative microswitch is ON

**Err 80 - RH Area stop from mat**

The cycle has been suspended because the operator is standing on the contact mat.

**Err 81 - LH Area stop from mat**

The cycle has been suspended because the operator is standing on the contact mat.

**Err 82 - CarrMag Attempt turning with TH up**

Warning message of incongruence on pneumatic movements. The system is attempting to rotate the carriage magazine with the tool holder high.

**Err 83 - CarrMag Attempt to raise with Mag closed**

Warning message of incongruence on pneumatic movements. The system is attempting to raise the carriage tool holder with the magazine closed.

**Err 84 - CarrMag Attempt closing with TH up**

Warning message of incongruence on pneumatic movements. The system is attempting to close the carriage magazine with the tool holder high.

**Err 85 - Load on empty carriage t.holder**

The system is attempting to load a tool onto an empty tool holder

**Err 86 - Load on empty machine t.holder**

The system is attempting to load a tool onto an empty tool holder

**Err 87 - Tool data mismatch on TC slot**

The data on the electric spindle are not coherent. Cone presence sensor = ON and magazine data which do not correspond. Cone presence sensor = OFF and magazine data which do not correspond. Correct the data.

**Err 88 - T.holder to unload NOT found**

The data on the electric spindle are not coherent. The sensor is signalling the presence of a cone on the electric spindle, but the magazine machine data do not indicate the unloading position. Correct the machine data.

**Err 89 - Unload on full t.holder**

The data on the electric spindle are not coherent. The unloading tool holder is indicated but the sensor for cone presence on the tool holder signals that it is not empty.

**Err 90 - Electrospindle to turn with cone UNLOCKED**

Rotation of the electric spindle is commanded but the sensor detecting the cone present and clamped is not giving a signal.

**Err 91 - Open BC mach. mag.comm.-not sent**

The opening microswitches of the magazine selected are both ON, one of them short-circuited.

**Err 92 - Open BC mach. mag.comm.-not rcvd**

The magazine has been commanded to open but does not move. Check that there are no mechanical impediments. Check that there are no solenoid valves switched by hand. Check that the lifting coil is receiving power. Check that the PLC opening output is ON. Check that the PLC closing output is OFF.

**Err 93 - TC command on slot where not poss**

Check that the option <Aggregate>, indicating enabling of tool change on the slot, has been selected in the <Type> field of the slot corrector data.

**Err 94 - Slot A overload cutout**

Slot overheated. Wait a few minutes.

**Err 95 - Insufficient Vacuum Machine In HOLD**

Check the cause of the vacuum failure.

**Err 96 - Work list line full**

Reset the number of pieces machined.

**Err 97 - Mach. Magazine Data incorrect**

Check the machine data. There is no congruence between the magazine machine data and the sensors which detect the tools on the magazine.

**Err 98 - Carriage Mag. Data incorrect**

Check the machine data. There is no congruence between the magazine machine data and the sensors which detect the tools on the magazine.

**Err 99 - Bad tool holder number**







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BIESSE S.p.A. Woodworking Machinery