Xilog Plus

for Bore-Milling Machines of the SCM Group

User Guide for the Machine Panel (PanelMac) by Xilog Plus - v. 1.11

v. 1.5 – September 2005

code 0000571272H

SCM GROUP

This manual has been designed to provide information relative to the use of Bore-Milling machines manufactured by the SCM Group.

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1. Installation and Start

Machine Panel by Xilog Plus can be installed on a personal IBM® computer or one compatible with the requirements listed below.

Minimum hardware requirements:

- CPU Intel® Pentium® or better;
- at least 128 MB Ram;
- drive for floppy disk 3” 1/2, 1.44 MB;
- drive for CD-ROM;
- at least 500 MB free space on hard disk;
- 2 serial ports;
- 1 parallel port;
- SVGA video card;
- color monitor with at least 800x600 pixels of resolution.

Minimum software requirements:

- Operating system, Microsoft** Windows 98 SE or subsequent.

(**) Windows 98 SE is a brand owned by the Microsoft™ Corp.

WARNING

The current system session must be turned off before the machine is switched off.

To the Xilog Plus Machine Panel, follow these instructions:

1. turn on the computer;
2. insert the installation CD-ROM into the drive;
3. open (by double clicking the mouse) *Compute resources*;
4. open the Xilog Plus CD-ROM;
5. open the folder *Disk1*;
6. start (always by double clicking the mouse) the file *Setup.exe*;
7. following the installation instructions.

During the installation procedure, the program will ask to select the type of communication doors from amongst the following options:

- **None (PC Office).** To be selected if the calculator is not connected to the Numeric Control (N.C.), but installation is carried out on an officer computer.
- **RS232 Com 1 (Serial)** and **RS232 Com 2 (Serial).** If the calculator is connected to the N.C. it is necessary to indicate which of the two serial ports (Com 1 or Com 2) is used for the connection.

To start the Machine Panel:

1. click on the **START BUTTON**;
2. select *All programs*;
3. select the folder *Scm Group*;
4. click on *PanelMac*.

To change current language:

1. start PanelMac;
2. click on the menu **TOOLS/INTERNATIONAL SETTINGS**;
3. select the flag for the desired country by clicking various times on the **LANGUAGE BUTTON**;
4. click on the **OK** button and proceed with the operations requested by the program to make the change effective.

2. Configuration

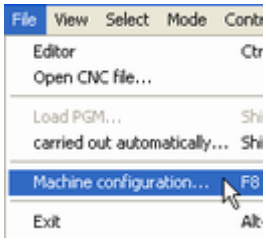
Xilog Plus is ready configured to operate with your machine. However, in some cases you may need to adjust some configuration files.

IMPORTANT!

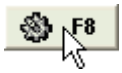
Most configuration files are configured by the manufacturer's technicians. Changing them may cause serious machine malfunctions!

► Open the configuration file Editor.

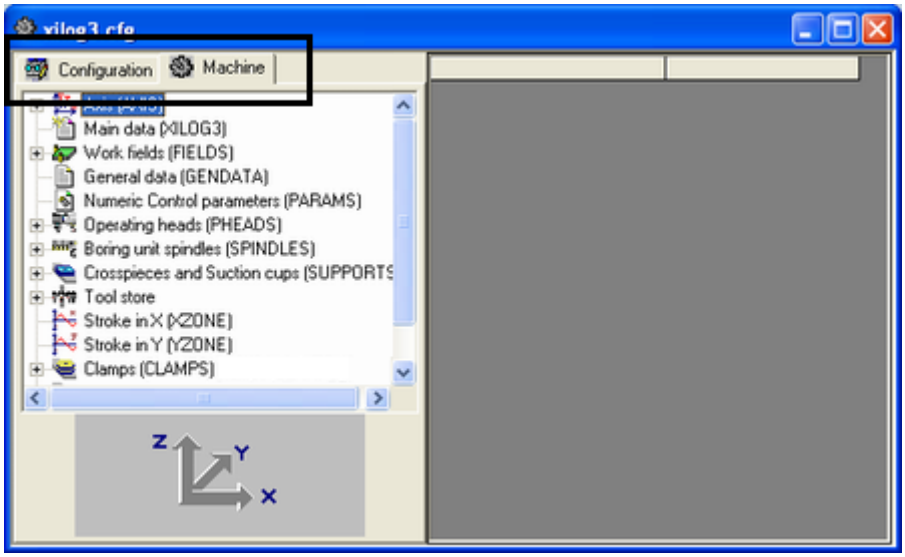
Click on the **FILE/MACHINE CONFIGURATION** menu...



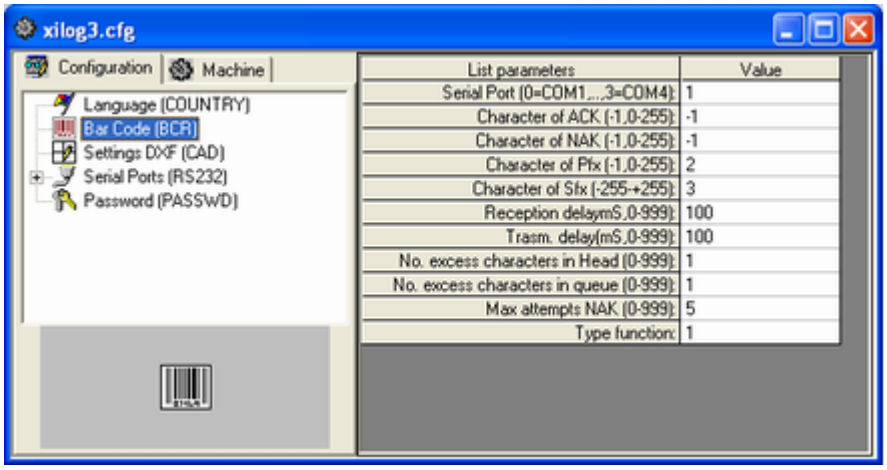
... or on the button.



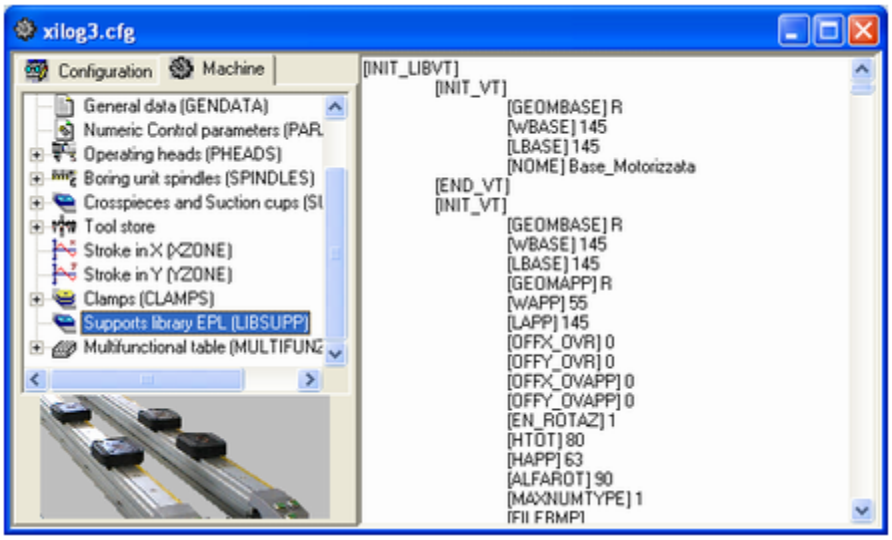
The configuration files are grouped in two sections: configuration (contains software configuration files) and machine (contains machine configurations files, normally set by the manufacturer).



A template with parameters is sometimes available to change the files:



In other cases, the files are simple text files that can be freely edited:



In the latter case, you can edit the files directly with any text editor, outside Xilog Plus. The configuration files have the extension .CFG and are in the folder ../Xilog Plus/Cfg. In the configuration parameters Editor their name appears in brackets after a descriptive title, without an extension (e.g.: in the editor file libsupp.cfg appears as “EPL Support Library (LIBSUPP)”).

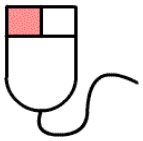
3. Introduction to Operating Environments

The Machine Panel presents itself with a window divided into four operational environments, each of which contains a different function:

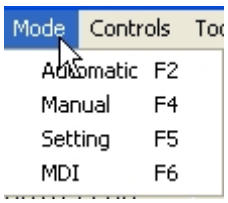
- **Automatic** (to execute work programs)
- **Manual** (for manual machine management)
- **Calibration** (to calibrate machine)
- **MDI** (to send ISO commands to the machine and manually manage tools)

► Shall we select an operating environment with the mouse.

Click on the label with the name of the environment..

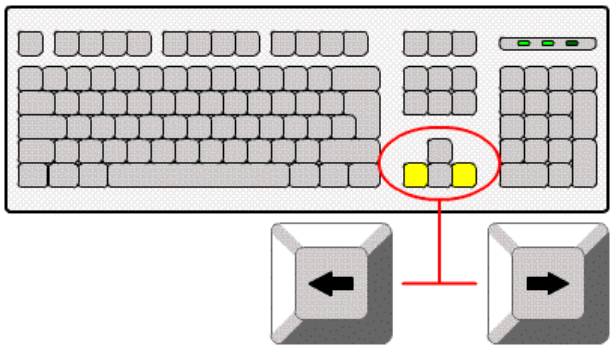


… or click on the **MODE MENU** and select an environment.



► Shall we select an operating environment using the keyboard.

To move between the operational environments press the arrow keys.



The four operational environment have some windows and functions in common.

A) Area for display of quotas. Displays the quotas relative to the movement of the working head. It is possible to view either all the quotas for each single axis or a selected axis (highlighted in green).

To select an axis from the Machine Panel it is possible to:

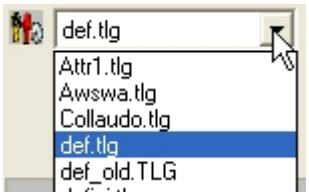
- click on the scroll arrows;

- click on the menu **SELECT/PREVIOUS AXIS** and **SELECT/NEXT AXIS**.

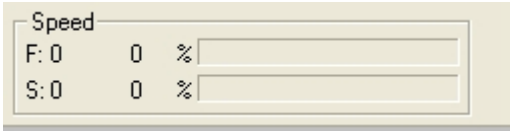
The axis can also be selected with the selector located on the machine's control panel, if present, or with that on the remote control (see: Appendix C).
The quotas can be displayed in various modes. To select a mode just click on he relative circle. The modes are:

- **OM**. Current quotas in machine coordinates.
- **OP**. Current quotas in piece coordinates.
- **OM+GOTO+ERR**. Current quotas in machine/Delta/Tracking error coordinates.
- **OP+GOTO+ERR**. Current quota in piece/Delta/Tracking error coordinates.

B) Tooling selection box. Allows tooling to be selected with the mouse to be used as foreseen by the work program. The selected tooling is called "active tooling". Active tooling can only be selected if there are no programs being run and must be done **before** running a program.



C) Speed display. Area reserved for displaying the speed of the work head speed path (F, expressed in meters per minute) and the rotation speed of the spindle (S, expressed in turns per minute); the respective current percentages are also displayed on the right of these two values, calculated based on the maximum value for the two speeds.



D) Common buttons

Editor for machine parameters

Displays the editor for the machine parameters.

Alarms window

Displays the alarm window. The operator finds himself in front of a table that displays the last 30 alarms with the date, time and a description of the type of alarm.
The possible operations are:

DESCRIPTION	If the help alarm is enabled, this opens the selected viewer and displays the help related to the error code to which the cursor is currently pointing to in the table;
ALL	Displays active and passive alarms.
ACTIVE	Displays active alarms (default).
EXIT	Exit.

Window for entering and exiting the PLC

Shows the display window of entrances and exits from the PLC. This function is useful for testing the machine and during remote assistance.
To edit a certain value to be sent to the PLC proceed as follows:

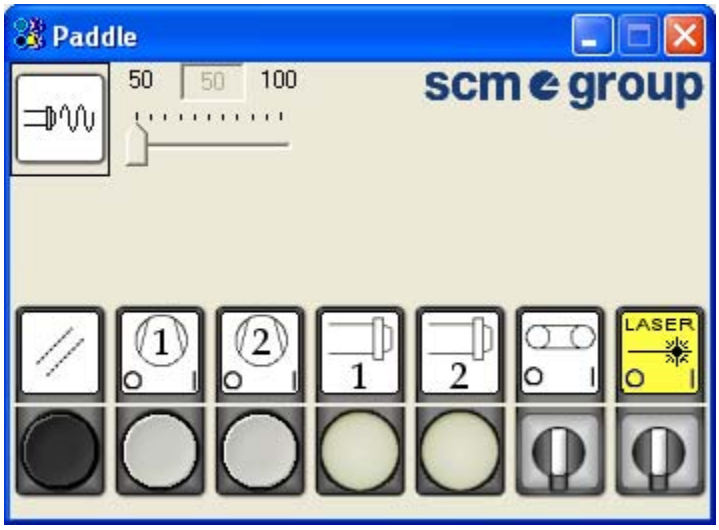
1. using the mouse or keyboard select the desired parameter;
2. edit the address for the PLC;
3. decide the format for viewing the address: decimal (D), hexadecimal (H), binary (B);
4. press the **OK BUTTON.**

Reset N.C.

Send **Reset** command to the N.C.

“Paddle” pushbutton panel.

Shows the “Paddle” pushbutton panel, which reproduces the machine control panel.


Paddle
50
50
100
scm group
1
2
1
2
LASER

4. Use of the Machine Panel

4.1 Operating sequence

The typical operating sequence for running a work program includes:

1. turn on the machine;
2. calibrate;
3. select tooling to be used as foreseen by the work program;
4. load work program on the Machine Panel;
5. run program.

To use the functions in each operating environment selected them as explained in chapter 3 – Introduction to operating environments.

4.2 Calibration

Calibration is the first operation to perform after having turned the tool machine on. If the machine is not calibrated the following icon will appear in the status bar:

and the operating environment cannot be used in Automatic to run the work programs.
To perform calibration, after having selected the Calibration operating environment, press the green **Start** key (on the control panel) or the **Start** key on the mobile code; calibration can be interrupted at any time by pressing the red **Hold** key (on the control panel) or the **Stop** key on the mobile code.
If, for some reason, the calibration cycle is not properly terminated (the "machine not calibrated" icon still appears in the status bar) the operation must be repeated.

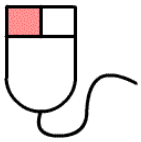
4.3 Automatic

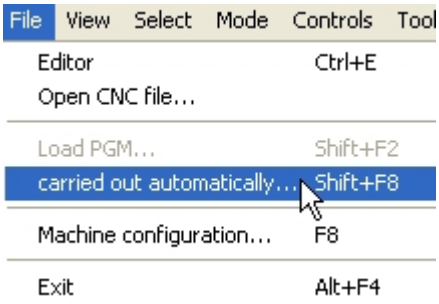
4.3.1 Running a Program

► Shall we run a program.

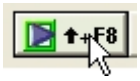
1

Click on the **FILE/CARRIED OUT AUTOMATICALLY** menu …





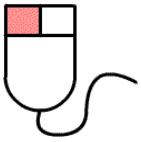
… or on the button to start automatic execution.

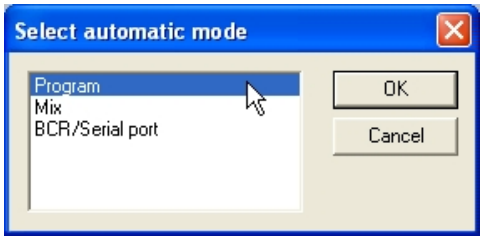


2

The Select automatic mode window will appear.

Click on *Program* and confirm by clicking on the **OK** button.

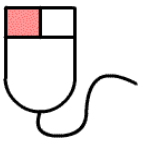


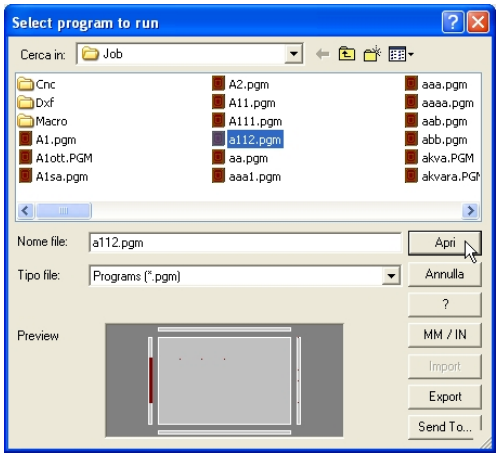


3

The Select program to run window will appear.

Using the mouse select the program to be run and confirm by clicking the **OPEN** button.



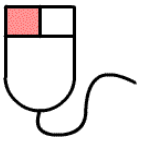


4

A screen will appear for changing the program Header.

The program Header can be changed. If the program contains parameters they can be changed: click on the **PARAMETERS** button to bring up the parameters table. Confirm any changes by clicking on the **OK** button.

The changes are not stored in the program (which maintains the original header), but are only valid for the current execution).

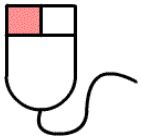


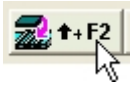
5

The Machine Panel will proceed with automatically translating the program into ISO language.

After having executing a program, we can start running other programs that will line up behind the current one. To re-open the *Select program to run* window click on the **FILE/LOAD PGM** menu…

... or the **LOAD PROGRAM BUTTON**.





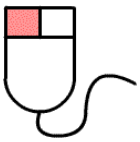
To start the work cycle press the **Start** key relative to the field of the machine associated with the program area (written in the header); if the area is not associated, the **Start** keys associated with each single area are active. The execution cycle can be interrupted at any time by pressing the **Hold** key situated on the control panel of the machine or by clicking on the **CONTROLS/END EXECUTION** menu. If the **Start** push-button of an area is pressed while the machine is executing a cycle on an another area, the area of the **Start** push-button will be reserved for machining. The **CONTROLS/RESET NC** menu sends a Reset command to the machine thereby canceling all bookings.

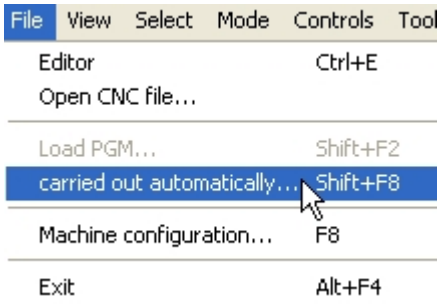
4.3.2 Executing a Mix

► Shall we execute a mix.

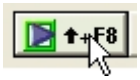
1

Click on the **FILE/CARRIED OUT AUTOMATICALLY MENU …**





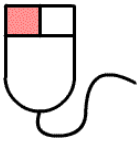
… or on the button for starting automatic execution.

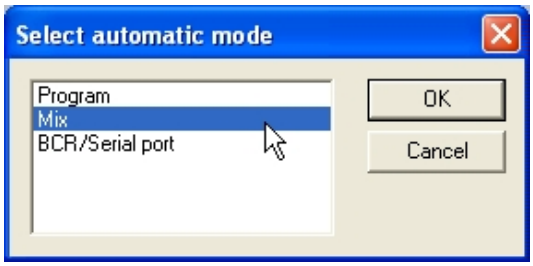


2

The Select automatic mode screen will appear.

Click on **MIX** and confirm by clicking on the **OK** button.

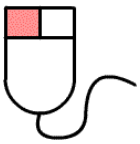


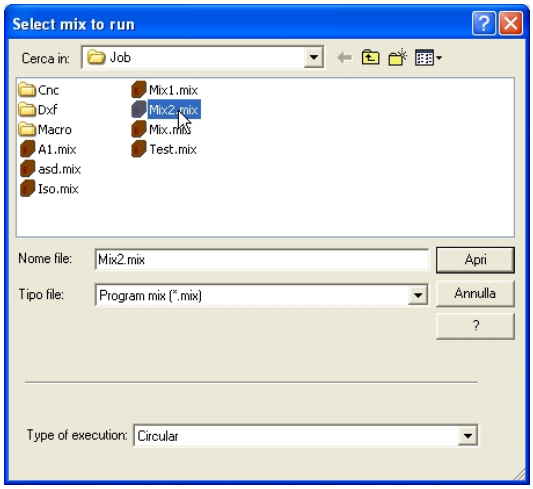


3

The Select mix to run window will appear.

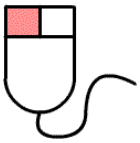
With the mouse select the mix to be carried out.



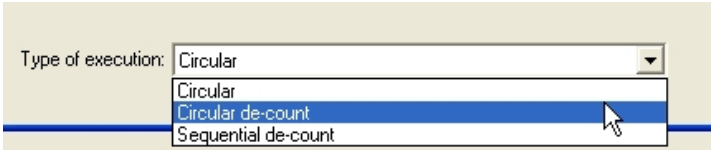


4

From the **TYPE OF EXECUTION** select the type of execution (see further on for a description of the types of executions for a mix). Click on the **OPEN** button.



Any changes to the parameters contained in the program headers are read directly by the parameters set in the mix steps.



To start the work cycle press the **Start** key relative to the field of the machine associated with the program area (written in the header); if the area is not associated, the **Start** keys associated with each single area are active. The execution cycle can be interrupted at any time by pressing the **Hold** key situated on the control panel of the machine or by clicking on the **CONTROLS/END EXECUTION** menu.
If the **Start** push-button of an area is pressed while the machine is executing a cycle on an another area, the area of the **Start** push-button will be reserved for machining. The **CONTROLS/RESET NC** menu sends a Reset command to the machine thereby canceling all bookings.
In call cases that differ from execution from BCR/serial line with "Type function" on 1 (see: chapter 4.3.3 - Bar Code Reader), when the execution of a mix is interrupted it is possible to store the interrupted mix as a file with a **.frz** extension. A .frz file can be run again by selecting it from the Select mix to run window, under **MIX INTERRUPTED** in the **FILE TYPE** box.

The programs contained in a mix can be run in three ways:

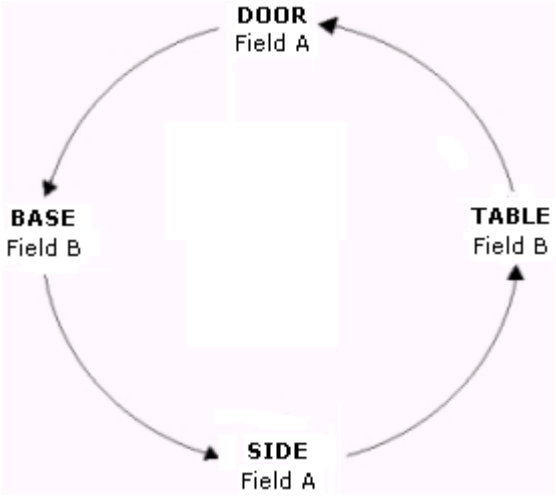
- **Circular** execution.
- **Circular count-down** execution.
- **Sequential count-down** execution.

1) Example of **circular** execution.

```
0001    P /DOOR DX=600 DY=400 DZ=20 –A C=0 T=0 R=1 *MM /PROVA.TLG
0002    P /BASE DX=600 DY=400 DZ=20 –B C=0 T=0 R=1 *MM /PROVA.TLG
0003    P /TABLE DX=600 DY=400 DZ=20 –B C=0 T=0 R=1 *MM /PROVA.TLG
0004    P /SIDE DX=600 DY=400 DZ=20 –A C=0 T=0 R=1 *MM /PROVA.TLG
```

The machining center runs one program after another continuously in a circular fashion, following the order in which the programs were written in the mix editor. They are divided into fields A and B according to the HEADERs and the number of repetitions is not considered.

The mix is run as illustrated in the diagram below and one program at a time is run each time you press the **Start** pushbutton on the worktable.

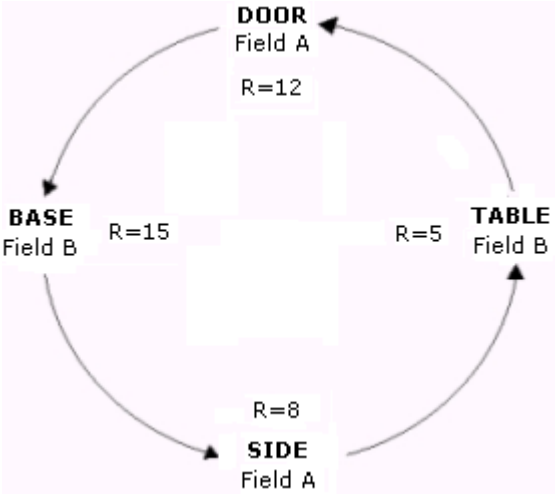


2) Example of a **circular count-down** execution.

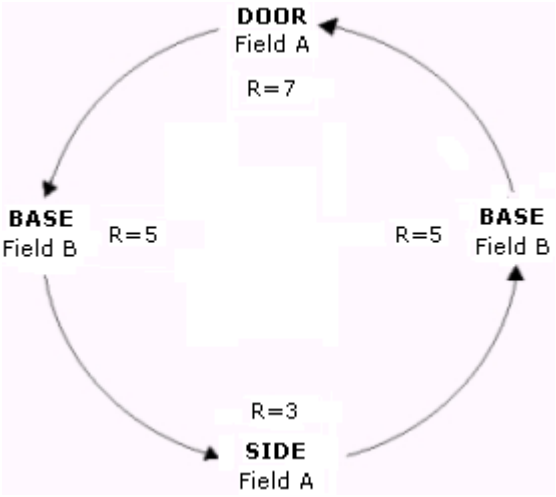
```
0001    P /DOOR DX=600 DY=400 DZ=20 –A C=0 T=0 R=12 *MM /PROVA.TLG
0002    P /BASE DX=600 DY=400 DZ=20 –B C=0 T=0 R=15 *MM / PROVA.TLG
0003    P /TABLE DX=600 DY=400 DZ=20 –B C=0 T=0 R=5 *MM / PROVA.TLG
0004    P /SIDE DX=600 DY=400 DZ=20 –A C=0 T=0 R=8 *MM / PROVA.TLG
```

The machining center runs one program after another continuously in a circular fashion, following the order in which the programs were written in the mix editor. The will be divided between field A and field B like in the Header. When the repetitions for each program are complete, execution is automatically switched off.

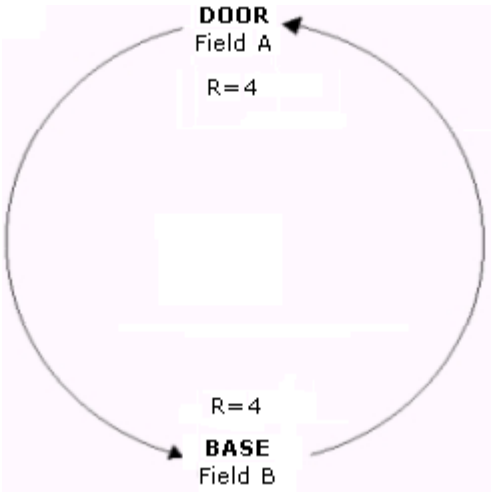
The initial mix is run as illustrated in the diagram below and is repeated 5 times, since this is the number of repetitions in the TABLE program (which has the least).



When each panel has been machined, the number of repetitions is reduced and upon completion of the first 5 cycles, the TABLE program is deleted from mix execution because all of the work pieces have been machined. At this point the mix execution continues as illustrated in the diagram below and the cycle will be repeated three times, which is the number of repetitions in the SIDE program (which has the least).



Upon completion of the machining in these 3 program cycles, SIDE is deleted from mix execution because all of its repetitions have been performed. Mix execution continues as illustrated in the diagram below and the cycle is repeated 4 times, as this is the number of repetitions required to complete the entire mix.

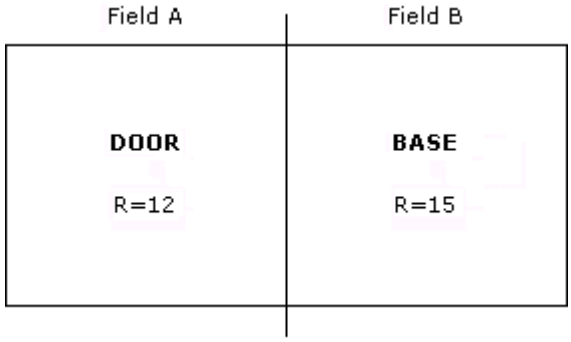


3) Example of a **sequential count-down** execution.

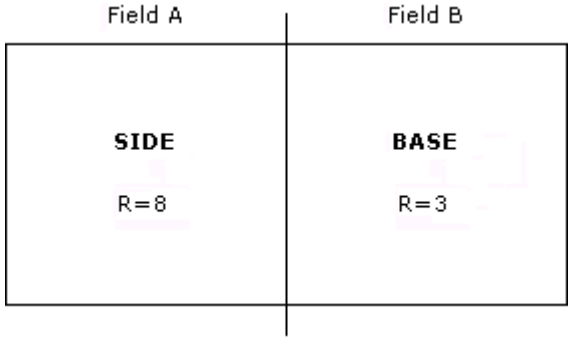
```
0001    P /DOOR DX=600 DY=400 DZ=20 –A C=0 T=0 R=12 *MM /PROVA.TLG
0002    P /BASE DX=600 DY=400 DZ=20 –B C=0 T=0 R=15 *MM /PROVA.TLG
0003    P /TABLE DX=600 DY=400 DZ=20 –B C=0 T=0 R=5 *MM / PROVA.TLG
0004    P /SIDE DX=600 DY=400 DZ=20 –A C=0 T=0 R=8 *MM / PROVA.TLG
```

The work center will continuously run one program at a time in sequential mode, according to the order in which they were written in the mix. They will be divided between field A and field B like in the Header. When the repetitions for one program are complete, it is automatically substituted by the next program.

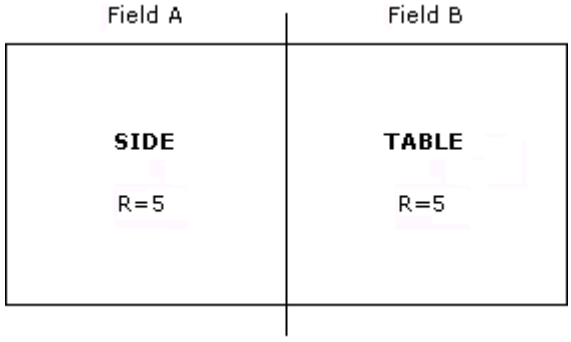
The initial mix is executed as illustrated in the diagram below and is repeated 12 times, which is the number of repetitions in the DOOR program (which has the least).



After the 12 repetitions (both in field A and in field B) the field A DOOR program is automatically substituted by the SIDE program (as shown in the list) and the mix continues as illustrated in the diagram below. It is repeated 3 times, as this is the number of repetitions remaining for the BASE program.



After the 3 repetitions (both in field A and in field B) needed to complete the field B BASE program work pieces, this is also automatically substituted by the next program, called TABLE (as shown in the list) and the mix is continued as illustrated in the diagram below. It is repeated 5 times, as this is the number of repetitions remaining to complete the entire cycle.



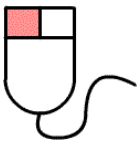
4.3.3 Bar Code Reader

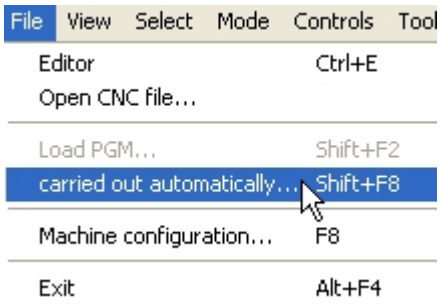
After enabling receipt from the serial line it is possible to insert mix steps through the BCR (Bar Code Reader) or through the host computer connected to the serial line.

► Shall we execute a program from BCR.

1

Click on the **FILE/CARRIED OUT AUTOMATICALLY MENU….**



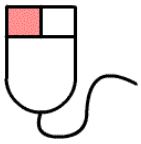


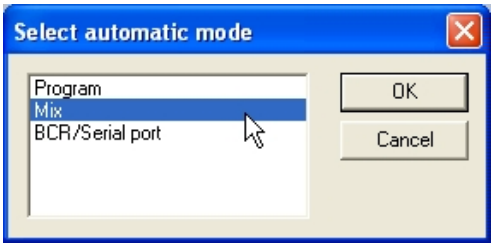
… or on the button for starting automatic execution.

2

The Select automatic mode window will appear.

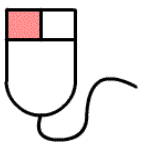
Click on **BCR/SERIAL PORT** and confirm by clicking on the **OK** button.





3

Click on the **CONTROLS/ENABLE READING OF BCR MENU…**



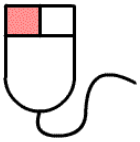
… or on the corresponding button.

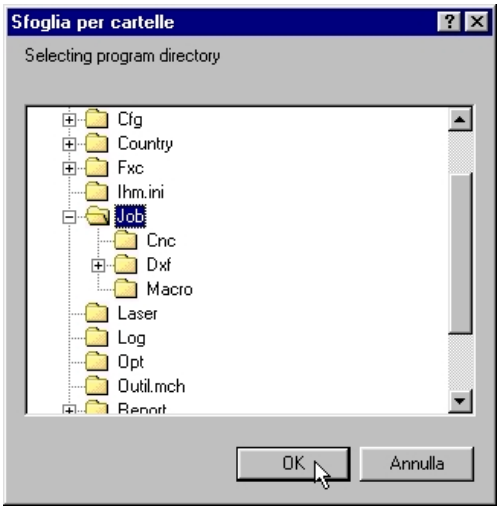
4

A window will appear for selecting the folder of programs to be loaded.

Select the folder containing the programs to be loaded. Confirm by clicking on the **OK** button.

Now the program can be loaded by reading the relative bar code with the BCR. The active status of reception from BCR is marked by an icon on the status bar. Reception from the BCR can be actived/deactived at various times during an execution using the controls indicated in step 3.





This method is connected to the "Type function" parameter configured in the bcr.cfg file.

- If the value of the "Type function" is 0, the programs read sequentially by the BCR are lined up by letter and form an actual mix of programs. The execution of this mix is a sequential count-down.
- If the value of the "Type function" is 1, when the name of a file to be run is received it is loaded onto all the origins available in the machine, bearing in mind the programmed field combinations (AB, CD, AD, etc.), or determined by the DX size of the piece (programmed field 00, 01, 10, 11).
- The number of repetitions is not considered and the program remains active until replaced. Reception of a new file name replaces the previous one on the free points of origin; origins are considered free if there is no clamped panel present, if no reservation is present or if execution is not in progress. If there are no free points of origin, the file is placed in the queue and replaces the previous file once an origin becomes free. It is not possible to place more than one program in standby, so further readings replace the file previously in the queue state.

WARNING

Ensure that the parameters for the serial ports and the BCR in the configuration files rs232.cfg and bcr.cfg, are correct and match the characteristics of the BCR.

Example:

For a serial Scanner with the following configuration:

COM	1
BAUD RATE	9600

PARITY	ODD
STOP BITS	1
DATA BITS	8

The **rs232.cfg** file must be programmed as follows:

Number	1
Bit Par.(0=N, 1=E, 2=O, 3=M, 4=S)	2
Character length (5-8)	8
Baud Rate	9600
Stop Bit (1, 1. 5, 2)	1

First hypothesis:

The scanner automatically adds the **STX** character (2) at the beginning of the label and the **ETX** character (3) at the end.

The **bcr.cfg** file must be configured as follows:

Serial Port (0=COM1, … , 3=COM4)	0
Character of ACK (-1, 0-255)	-1
Character of NAK (-1, 0-255)	-1
Character of Pfx (-1, 0-255)	2
Character of Sfx (-255-+255)	3
Reception delay (mS, 0-999)	100
Transm. delay (mS, 0-999)	100
N° excess characters in head (0-999)	1
N° excess characters in queue (0-999)	1
Max attempts NAK (0-999)	5

The label will be of the type:

TEST –A R2 DX1000 DY500

Second hypothesis:

The prefix and suffix characters are / (47) and + (43) respectively, and form part of the label.
The **bcr.cfg** file must be configured as follows:

Serial Port (0=COM1, … , 3=COM4)	0
Character of ACK (-1, 0-255)	-1
Character of NAK (-1, 0-255)	-1
Character of Pfx (-1, 0-255)	47
Character of Sfx (-255-+255)	43
Reception delay (mS, 0-999)	100
Transm. delay (mS, 0-999)	100
N° excess characters in head (0-999)	1
N° excess characters in queue (0-999)	1
Max NAK attempts (0-999)	5

The label will be of the (CODE 39) type:

/TEST –A R2 DX1000 DY500+

WARNING

The scanner must be enabled to operate in RS232 mode.
The scanner must not activate any hardware control (CTS/RTS) or any software control (XON/XOFF).
The scanner must not insert any pause between the start of one character and the next.

4.3.4 Other Available Functions

4.3.4.1 Synoptic of the Fields

The fields synoptic represents the programs being executed as positioned in the programmed field. The rectangle that represents the work assumes a specific color for each stage of the work.

- white: panel not clamped;
- blue: panel clamped;
- light blue: Panel locked and machining cycle selected
- green: panel with cycle running
- red: error during execution

The rectangles that represent the programs being executed can be selected either with the mouse or with the buttons.

When the execution of a cycle is complete, the number of repetitions of the program carried out decreases and, if the value of this number is 0, the rectangle that represents the program is canceled from the fields synoptic. For this reason if you want to run again a program that has terminated the repetitions it must be reload using the **FILE/LOAD PGM** menu.

The field mimic highlights the associations of the areas. For instance, if the machine has two work areas, A and B, and if a program has been loaded on the double area BA, the field window is completely occupied by a single panel.
The possibility of combining the fields, either homogenously or not homogenously, is determined by the "Homogenous Mix (0=NO,1=YES)" parameter of the machine configuration file xilog3.cfg. If this parameter is 1, only homogeneous associations are

possible. In this case, if the machine has 4 work areas (A, B, C, D), the following combinations are possible (exclusive amongst them):

- individual areas: A, B, C, D;
- paired areas: AB, BA, CD, DC;
- single area: AD, DA..

Otherwise, if the parameter is set on 0, all combinations are possible as long as there are no overlapping areas. In this case, for instance, the combination A, B, DC would be possible. The combination A, B, DA would instead not be possible. In this case, the area is calculated automatically on the basis of the DX dimension of the tool (which establishes the combination) and the following convention:

- first figure: 0 = area not specular in X (programmed with SX=0), 1 = area specular in X (programmed with SX=1);
- second figure: 0 = area not specular in Y (programmed with SY=0), 1 = area specular in Y (programmed with SY=1).

The SX and SY values for each area are programmed in the fields.cfg configuration file.

4.3.4.2 Simulated and Step-by-Step Execution Mode

Apart from the normal mode, a program can be executed in four other operating modes as well:

- **simulated mode:** allows a program test to be performed without moving the axis.
- **step-by-step mode:** allows the "step by step" program to be executed; the **Start** button must be pressed for each single step.
- **dry run test mode**: used to execute a test of the program with movement of the machine axes, varied only for direction Z, by an additional value programmed by the operator; the "M" codes in the part program are all processed and activated in the machine, with the exception of turning on the spindle and the block piece request.
- **flap test mode:** used to execute a simulation of the program without moving the machine axes and without processing the "M" codes in the part program.

The dry run test mode and the flap test mode are an alternative to the simulated mode.

After loading a program, click on buttons

(execution in simulated mode)

(execution is step by step mode)

(execution in dry run test mode)

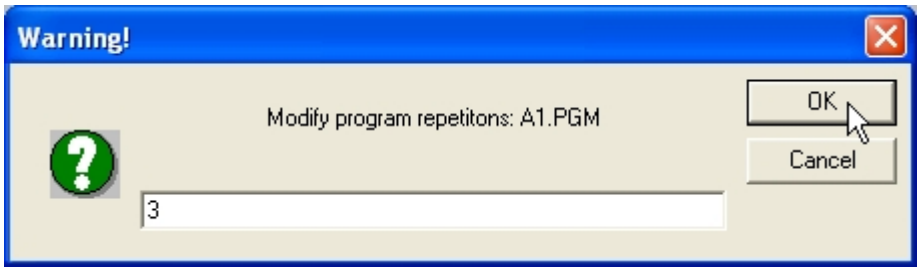
(execution in flap test mode)

to activate the modes. To deactivate the selected mode, just click on the relative button a second time.

4.3.4.3 Changing the Number of Repetitions for a Program

After having loaded a program, the number of repetitions can be changed. Click on the button

A window will appear that will enable you to change the number of repetitions for the program selected in the synoptic of the fields.

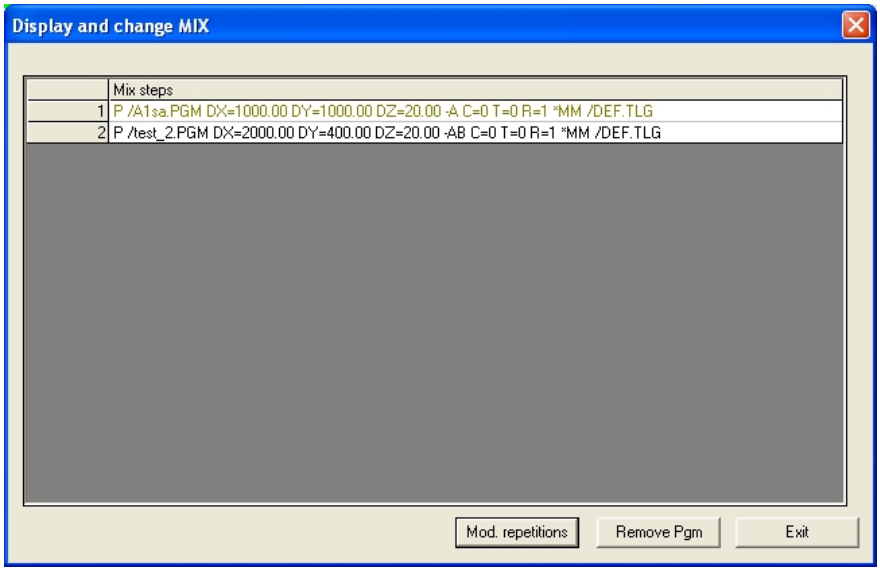


Insert the number of repetitions desired in the box and click the OK button.

4.3.4.4 Display and Change Mix

After having loaded a mix, it can be viewed and changed. Click on the button

A window will appear displaying the programs that are part of the mix.



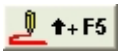
The programs can be selected with the mouse. The buttons available in this window are:

- **MOD. REPETITIONS.** Allows you to change the number of repetitions for the selected program (see: chapter 4.3.4.3 – Changing the Number of Repetitions for a Program).
- **REMOVE PGM.** Eliminates the program selected.
- **EXIT.** Closes the window for changing the mix.

If you modify a mix or the programs or sub-programs retrieved by the mix **while it is running**, this may result is serious malfunctions. In contract, you can safely modify other Mixes, programs or sub-programs which are not involved in the Mix currently running.

4.3.4.5 Program Animation

A graphic animation can be viewed while the program is running. Click on the button



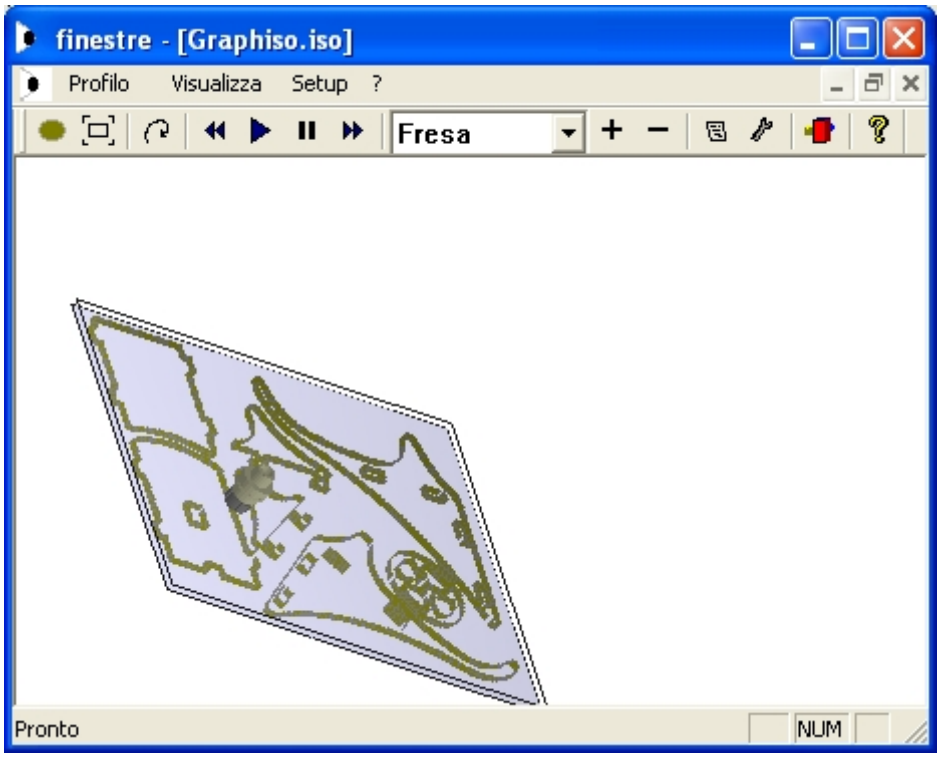
A window will appear that shows the animation for the program that is running. The buttons available in this window are:

- **CLEAR SCREEN.** Cancel current graphics.
- **ESC.** Closes the animation window.

4.3.4.6 Graphic Program Simulation

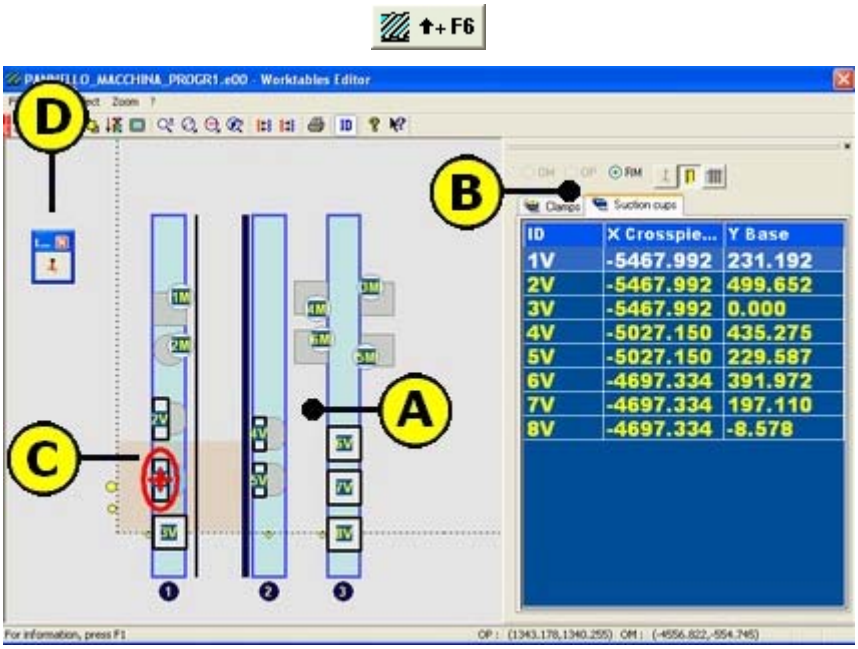
Before a program is run on the machine, a three-dimension graphic simulation can be viewed. Click on the button

A window will appear with the graphic simulation (see: Appendix A for a description of the controls available in this window).

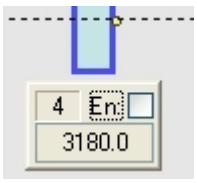


4.3.4.7 Displaying Worktable Programming

It is possible to view the worktable programming. Click on the button



A) Worktable. The supports positioned on the worktable are identified by an identification code (ID) and can be selected using the mouse. The ID may be displayed or hidden using the options on the **VIEW/SHOW / HIDE ID** menu. Furthermore, with the **VIEW/SHOW / HIDE CROSSPIECE DISPLAY** menu the crosspiece displayers may be displayed or hidden.

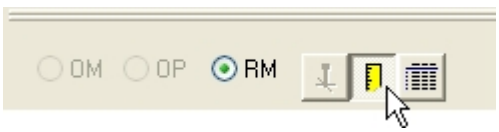


The check /uncheck **En** box permits to enable the trasmission of the positions to the displayers on the cross bar.

B) Support dimensions bar. Shows the information necessary (positions, etc.) for positioning the programmed supports on the work table. This information is displayed in three Modes:

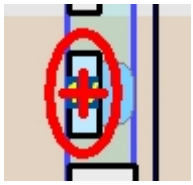
- **Laser mode.** Shows the support insertion points based on the machine origin (OM) or on the panel origin (OP);

- **Metric ruler mode (displayers).** Indicates the support insertion points based on the metric ruler (RM).



- **Detail mode.** Indicates the support insertion points with greater details displayed in function of the case with respect to the various origins.

C) Flashing pointer. If the machine comes with a laser and if a program with automatic suction cup position control enabled (see field V of the Header) has been automatically loaded, when the EPL is opened, a flashing pointer appears.



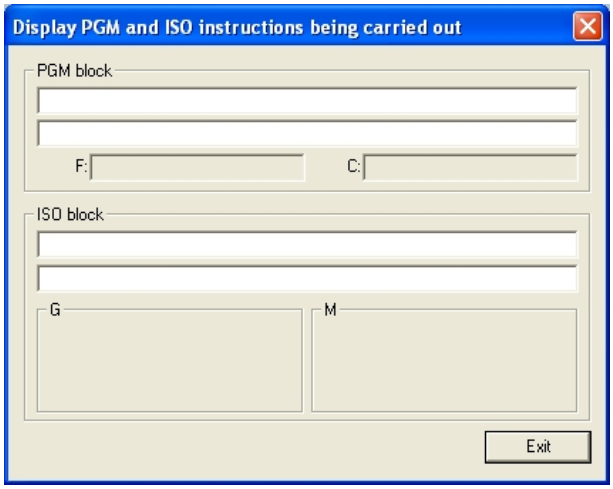
This pointer indicates the point on the work table highlighted by the laser.
The positions indicated by the flashing pointer are highlighted on the support position bar.
With each **Start** command to the mobile control, the pointer moves to the new support indicated by the laser.

D) Bar for laser cross disabling. Makes it possible to disable (if present) the display of the flashing pointer.

4.3.4.8 Display of ISO Blocks in Execution

By clicking on the button

you access the display of PGM instructions and the ISO block currently in execution.



Each section shows two instructions or blocks: the current one down the bottom, and the previous one up the top. Because of the execution speed of the instructions it is possible that some instructions are not seen as they pass into the boxes of the current blocks. By disabling and then enabling the blocks display again, while the program is in execution, you obtain a new display starting from the white boxes. The section PGM Block also displays the current

face (F) and the type of tool radius correction (C); the ISO Block section also displays the active G and M functions.

WARNING

The blocks display is only available on some machines with NUM® control.

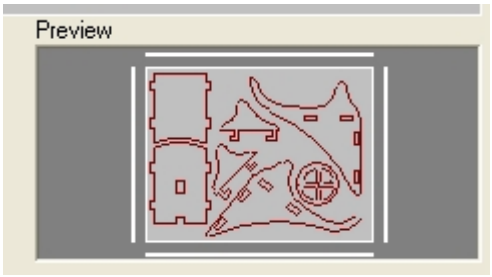
4.3.4.9 Display of Tool Change during Execution

A tool change can be viewed while a program is under execution. Click on the button

See: chapter 4.5.4 – Management of Tool Room Store.

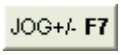
4.3.4.10 Work Preview

This box shows a preview of the selected process.



4.4 Manual

In manual mode the control of the machine is left to the operator who, using the commands on the control panel or the remote control, can incrementally move the selected axis
In this mode, the current axis is highlighted (in the encoder position window) by a green background. If configured, also the auxiliary axis of the boring unit is displayed.
The (+) key of the machine's control panel or remote control moves the selected axis forward (towards a higher quota); the (-) key moves the axis backwards (towards a lesser quota). The movements of the axis are functions of a JOG value set with the **CONTROLS/CHANGE JOG MENU OR RELATIVE BUTTON**



This value is visible in the state bar and can be:

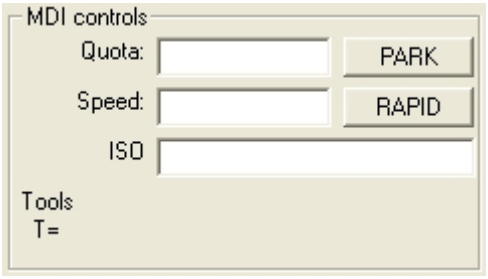
- indefinite (JOG): the axis moves as long as the key is kept pressed;
- 1, 10, 100, 500, 1000, 10000: the axis moves as far as the number of thousandths of millimeters indicated.

The control is switched to manual mode also when the corresponding key located on the control panel of the machine is turned. In this case, if the current mode is an operative mode (such as for instance the AUTOMATIC PROGRAM mode), and if the machine **is not currently executing a program**, the interface switches automatically to the MANUAL mode.

4.5 Manual Data Input (MDI)

4.5.1 MDI Controls

With the Manual Data Input status it is possible to control the machine directly by setting positioning quotas, in other words instructions in ISO language (which is the language used for Numeric Control). The set instruction must be confirmed using the **[ENTER] KEY AND ITS EXECUTION IS CONTROLLED BY THE Start** key on the control panel or remote control.



The window for MDI controls can be activated with the **CONTROLS/ISO CONTROLS MENU OR BY PRESSING THE BUTTON**

With the MDI controls the operator can enter the following instructions:

- **Quota**: the quota at which to position the axis (if necessary the one for parking by pressing the **PARK BUTTON**);
- **Speed**: the feed path speed of the axis (if possible, the one in rapid by pressing the **RAPID**);
- **ISO**: the instruction in ISO language that you want to carry out. The set ISO instruction must be confirmed with the **[ENTER] KEY AND ITS EXECUTION CONTROLLED WITH THE Start** key of the control panel or remote control.

4.5.2 Manual Test of the Boring and Milling Units

With sequential selection using the **CONTROLS/TEST SPINDLES** menu or the button

it is possible to access the manual test pages for all machine boring and milling heads programmed in the pheads.cfg file. The configuration pages serve as configuration parameters for the heads that can be: controlled by a three-phase motor or by a frequency converter; fixed or Vector or pneumatic rotation.
The icons that represent the test can be selected with the mouse and in many cases have a box for entering data. Test selection and setting is confirmed with the **[ENTER] KEY AND THE EXECUTION CONTROLLED WITH THE Start** key on the control panel or remote control.

Borer

Before power up extract at least one fuse otherwise it will not come on, to shut down, disable power up.

Selecting a single spindle.

The number of the desired spindle must be entered into the box, with a value from 01 to 96, depending on the configuration of the boring machine.

Spindles Start-up/Turn-off.

The box is needed to set:
- value = **0** (off): boring unit rises and spindles are tuned off
- value = **1** (on): boring unit descents and spindles are switched on

For boring units with Ever step by step activation, this icon only provides start-up.

If one or more spindles of the borer fixed unit are controlled by a **frequency converter**, the spindle ON/OFF key is like the one for the electro-spindle. There are also controls to invert the rotation direction and speed setting (see **"Electro-spindle"**).

Electro-spindles

The correct sequence for the controls is: Activation, Number of turns, On, Clockwise/Anticlockwise; if activation is not available the other controls have not effect; to switch off select Off, which only works if there is activation.

Head Descent/Head Rise.

By clicking on the icon in sequence first there is the descent and then the rise.

Spindle On/Off.

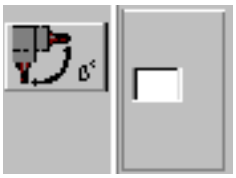
The box serves to set:
- value = **0**: activate off
- value = **1**: activate on

Activate spindle clockwise/anticlockwise.

The box serves to set:
- value = **0**: clockwise activation
- value = **1**: anticlockwise activation

Speed (number of turns)

To set the speed in the box enter a two digit number (between 0 and 99) which will then be automatically multiplies by 1000. Example: to indicate the speed of 18000, enter 18.

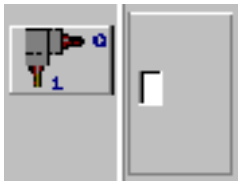


Vector movement Code
(only for electro-spindles with Vector)

The box serves to enter a three digit number (in degrees) to indicate the desired angle. Transmission and movement is activated by clicking on the icon.

Special Units (Universal, Blade, Slotter)

These special units have the same controls as the electro-spindle, except for speed settings which are not present if the unit is controlled by a three-phase motor, and for Vector movement which, only if it is a pneumatic rotation unit, is substituted by the following:

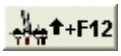


Rotation in 0° position/rotation in 90° or 180° or 270° position (depending on the unit configuration in pheads.cfg; only for units with pneumatic rotation)

The box is used to set:
- value = **0**: rotation in position 0°
- value = **1**: rotation in position 90° or 180° or 270°

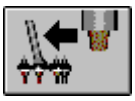
4.5.3 Tool Change Manual Test

Sequential selection using the **CONTROLS/TOOL CHANGE TEST MENU OR THE BUTTON**

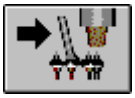


makes it possible to access pages of the test manuals for all machine stores configured in file storepos.cfg.
The icons that represent the tests can be selected with the mouse and in many cases represent a box for entering data. Test selection and setting is confirmed with the **[ENTER]** button and execution is controlled with the **Start** key on the control panel or remote control.

Store D – Rapid



Transfer tool store towards neutral.



Transfer tool store towards spindle.

Tool store descent.

Tool store rise.

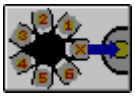
Activate block unblock spindle tool.

Descend tool store cut out unit.

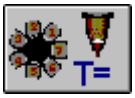
Rise tool store cut out unit.

Search tool store origin.

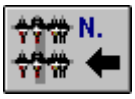
Rotate tool store by one position



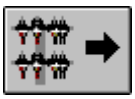
Start tool change cycle.



Save tool number in spindle.



(Only Tool Room) Arm Y, RAPID tool change from center towards Tool Room.



(Only Tool Room) Arm Y, RAPID tool change from Tool Room towards center.

(Only for pneumatic hood) Hood high.

(Only for pneumatic hood) Hood low in position 1.

(Only for pneumatic hood) Hood low in position 2.

(Only for pneumatic hood) Hood low in position 3.

(Only for pneumatic hood) Hood low in position 4.

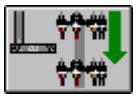
(Only for motorized hood) Descent of pneumatic actuator connected to the bellow of the hood.

(Only for motorized hood) Rise of pneumatic actuator connected to the bellow of the hood.

(Only for motorized hood) Search origin.

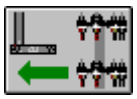
(Only for motorized hood) Control for electrical positioning of end of run stop of pneumatic actuator.

Store T - Tool Room

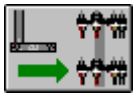


Tool Room Descent.

Tool Room Rise.



Tool Room towards Rapid.



Tool Room moving away from Rapid.

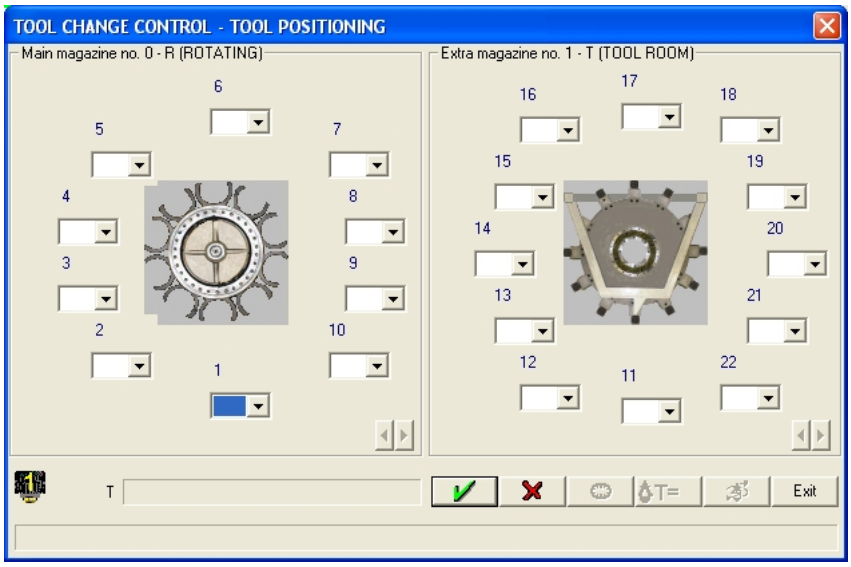
Tool blocking in Tool Room.

Tool unblocking in Tool Room.

4.5.4 Management of Tool Room Store

If the machine has a supplementary tool change like Tool Room (T), selecting the **CONTROLS/TOOL ROOM MANAGEMENT MENU OR BUTTON**

will activate the Tool Room management window.



The window is divided into two parts:

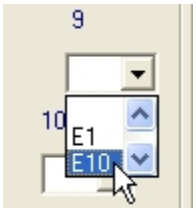
- the left which outlines the spaces in the main store;
- the right which outlines the spaces in a single rack of the supplementary Tool Room store.

If the machine has more than one rack, the others can be viewed by clicking on the arrows in the scroll bar.

With the Tool Room management window it is possible to:

a) set the initial position of the tools in the stores so that they can be loaded manually:
b) program the cycles for loading and unloading the tools from the stores.

a) The user of the machine must set the tools, which he is preparing to load manually, into a certain position in the store. The tool can be selected, using the mouse, from amongst those available in drop-down menu in each position, represented by their name E*n*, plus any multiple heads identified with the letters A*n*.



The tools are represented by three types.

- The type 1 tools are cylindrical with a diameter dimension which is less or equal to the general parameter (GENDATA) 'Max diameter tool type 1'.
- The type 2 tools are like type 1 but with a diameter dimension greater than the value programmed in the above mentioned parameter.
- The type 3 tools are the angle transmission heads and machining units.

The same tool number cannot be associated to two different store positions.

Note. If the tool magazines are configured with fixed places, the 1st and 3rd clamps are set as shuttle clamps; i.e. they are reserved for tool transfers. The graphic shows the tools in transit on the shuttle clamp; tools cannot be programmed on these clamps, but any tools present on the clamps can be cancelled. The passage from a tooling file to another is only allowed if there are no tools either on the spindles or on the shuttle clamp.

To confirm settings click on the button

To delete settings click on the button

WARNING

The physical position of the tools in the machine must absolutely correspond to the conditions set

b) The user can program loading and unloading the tools from the store. The tools in the rotating store can only be unloaded and those in the supplementary store can only be loaded; the load and unload program must meet the rules imposed by the number of positions in the stores and by the side volume of the tool (highlighted in the icon for that tool). In this case, when the table is confirmed the machine is enabled to proceed with actual tool change. At this stage the user must wait for the Load/Unload cycle to be completed.

Tool Change Optimizer

The tool change optimizer is a software module that is an integral part of Xilog Plus, but it can only be installed on machines equipped with Tool Room. It automatically manages the use of tools foreseen by the work program. If functions in both Automatic and MDI mode.

Main features:

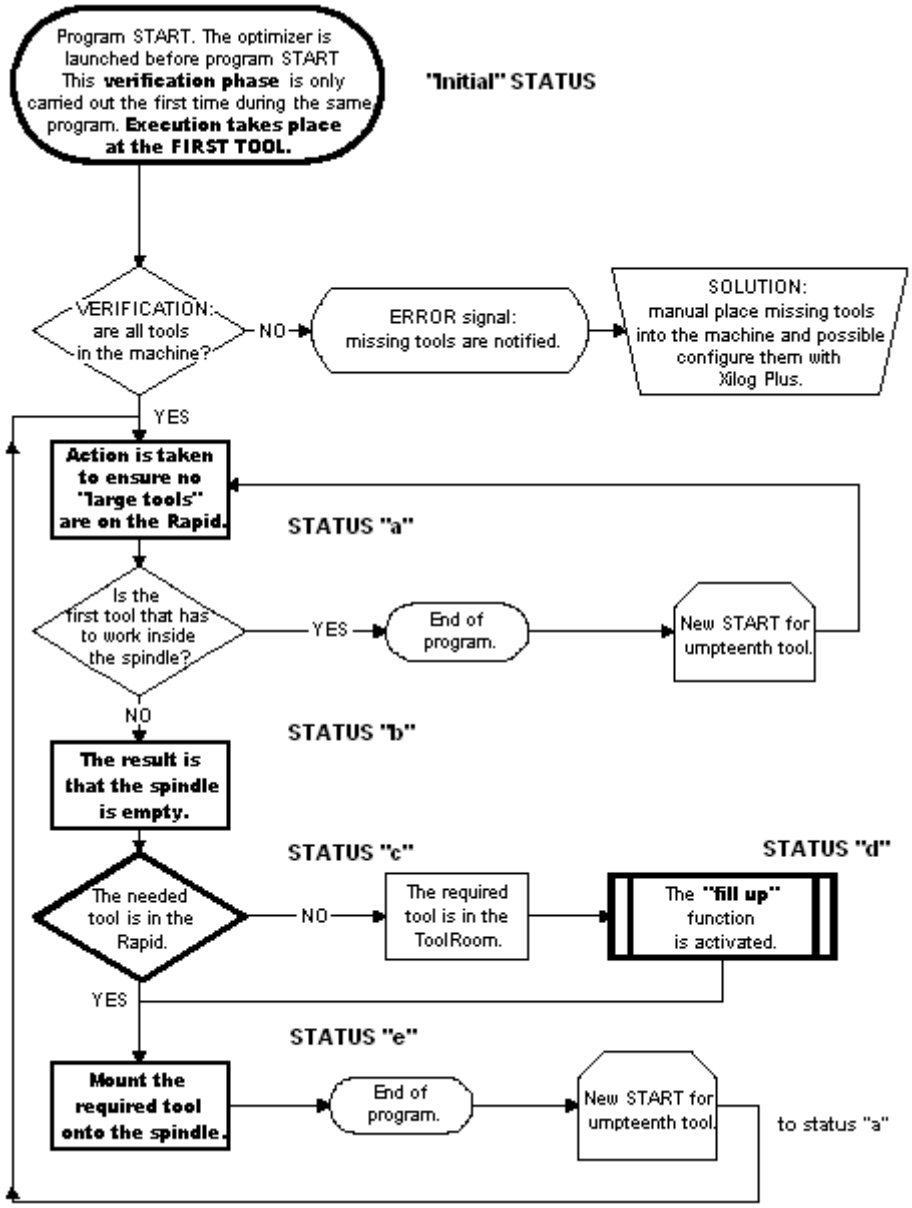
a) Before performing a machining cycle, the software that all the tools required for the work to be done are present on the machine (on the spindle, on the Rapid or on Tool Room) .
b) It removes any obstacles that might prevent a tool from being fitted on any of the grippers on the Rapid. The new system incorporates various rules for preventing collision between the tools on the Rapid and on Tool Room. This means any tool can be placed on any gripper of the Rapid.
c) It automatically fills the Rapid with all the tool required for the machining cycle to be carried out. If the Rapid cannot

contain all the tools required, automatic filling is carried out two or more times.

All available tools must be manually loaded into the stores (warning: do not manually load any tool directly onto the electro-spindle), in a completely casual manger and without any limitations (verifying that each tool does not collide with the tool next to it), until all available positions are full. Note: the tables in the Tool Room management window must show the exact physical arrangement of the tools in the stores.
When the first program to be run Starts, the optimizing module will automatically transfer onto the Rapid the greatest number possible of tools to be used next When the tools needed to implement the program exceeds the capacity of the Rapid, the optimizing module will unload those that are no longer needed and load the remainder.

N.B. 1) The table must be updated each time a tool is moved manually. 2) The table entries must always match the tools mounted on the store in order to prevent tool collisions during machining.

Functional strategy of the optimizing module


Program START. The optimizer is launched before program START This verification phase is only carried out the first time during the same program. Execution takes place at the FIRST TOOL.
"Initial" STATUS
VERIFICATION: are all tools in the machine?
NO
ERROR signal: missing tools are notified.
SOLUTION: manual place missing tools into the machine and possible configure them with Xilog Plus.
YES
Action is taken to ensure no "large tools" are on the Rapid.
STATUS "a"
Is the first tool that has to work inside the spindle?
YES
End of program.
New START for umpteenth tool.
NO
STATUS "b"
The result is that the spindle is empty.
STATUS "c"
STATUS "d"
The needed tool is in the Rapid.
NO
The required tool is in the ToolRoom.
The "fill up" function is activated.
YES
STATUS "e"
Mount the required tool onto the spindle.
End of program.
New START for umpteenth tool.
to status "a"

5. Table Management

5.1 Management of TVS Table

Xilog Plus is able to manage the automatic suction cups/cross-bars (TVS) independently by means of a PLC serial line.
To set TVS management, two parameters included in the xilog3.cfg setup file must be compiled:

1. the “Table” parameter must be set at 2;

2. the “Number COM Automatic Suction Cups” parameter must be paced equally on:

- -1 to deactivate all controls;
- 0 to activate management through COM1 of the PC;
- 1 to activate management through COM2 of the PC;
- 2 to activate management through COM3 of the PC;
- 3 to activate management through COM4 of the PC;

Using control by means of COMx allows the user to position the suction cups of one working area while the machine is executing the piece of another area; Xilog Plus sends the position values to the suction cups of an area when the program for that area is loaded, while it checks that all the suction cups of an area are in position whenever the relative program **Start** button is pressed.
If one of the following errors occurs during production:

NCI(61-0)…
NCI(62-0)…
NCI(63-0)…
NCI(64-0)…
NCI(65-0)…
NCI(66-0)…
NCI(67-0)…
NCI(68-0)…
NCI(69-0)…
NCI(70-0)…
NCI(71-0)…
NCI(73-0)…,

execution must be cancelled after having eliminated the error message; if not the communication with the suction cups will not be restored.

5.2 Table Management Using Laser Lights

Xilog Plus is able to control positioning of crosspieces and suction cups by means of one or more laser lights fitted to the machine (where available).
Each light is configured in pheads.cfg by choosing any position between 12 and 96; the fields to be programmed are:

“Actuator”	Must be 4.
“Set up 0”	The light offset in relation to the reference head (X and Y only).
“Set up 1”	Offset of sight from suction cups (only X and Y).
“Motor Number”	Programmed with the laser light order number.

To proceed with position the suction cups:

1. The program header must have the V parameter set on 1, 11, 21 or 31.
2. The program execution is launched in automatic. If the work field changes, Xilog Plus automatically converts the suction cups position established by the program.
3. The window that displays the worktable programming is activated (for example, with the **VIEW/SUCTION CUP POSITION** menu); the panel that represents the program in the synoptic of the fields becomes orange in color.
4. Press the **Start** key for the work area. The machine projects a laser light onto the position where the first suction cup must be positioned. After manually positioning the suction cup, press the Start key again and the machine goes on to indicate the position of the next suction cup.
5. After having positioned the last suction cup, the panel that represents the program in the synoptic of the fields becomes green in color. Return to automatic environment and start program execution.

5.3 Table Management Using Special Head

Xilog Plus is able to control positioning of crosspieces and suction cups by means of a special head (where available).
Management is activate by placing the “Number COM Automatic Suction Cups” field of the xilog3.cfg file on 6.
The positioning procedure is exactly the same as described in the previous paragraph.

6. Report

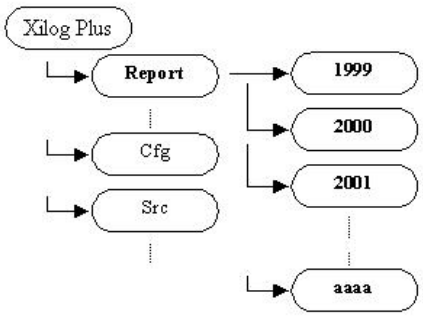
6.1 Report File

The report is a text type file (ASCII) that carries information regarding the utilization and exploitation of the machine where Xilog Plus Machine Panel is running.

There are two types of reports:

- **Production report**, orientated towards production;
- **Diagnostic report**, oriented towards the way the machine functions during production.

This function can be used to display in a table the information contained in the files with .DIA and .PRO extensions, containing respectively the diagnostic and production reports. These files are prepared during the Xilog Plus Machine Panel automatic work phase and can be displayed by clicking on the **DISPLAY/REPORT FILE** menu.



The Xilog Plus folder contains a subfolder called *Report* (created when the software was installed), which contains a folder for each report year of the machine used (created during software execution). A Report file is created and saved within each year/directory containing the information for the individual daily use: as there are two types of Report, for each day the machine is used, there will be two files created in each year directory. The format of the file name to be saved is based on the following criteria:

- **production** report for the day dd/mm/yyyy: **yyyymmdd.pro** file (ASCII file)
- **diagnostic** report for the day dd/mm/yyyy: **yyyymmdd.dia** file (ASCII file)

For example if the machine is used on 30 June 1999, at the end of the day in the Report\1999 directory, there will be two new files : *20020630.pro* and *20020630.dia* .

6.2 Production Report

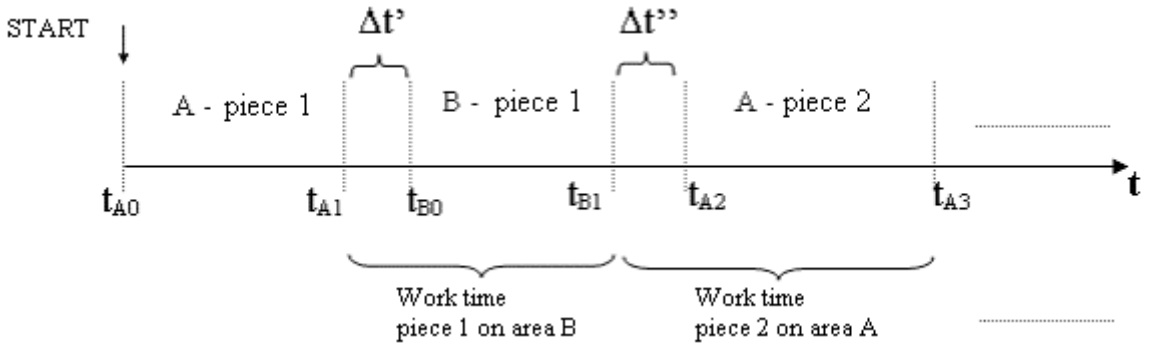
The report will list a series of information to do with the productive life of the machine which, if we wished to express this in a table, would look like the following :

Area	PGM Progr.	Measurements	Start Hour	Stop Hour	eff.T	tot.T	Quantity	Average T	Description
A	Pippo.pgm	1000x800x18.2	8:30	10:30	1:00	2:00	5	0:12	…
CD	pluto.pgm	800x500x20	8:40	10:00	0:50	1:20	2	0:25	…
B	Pippo.pgm	1000x800x18.2	8:50	10:50	1:00	2:00	5	0:12	…

Area : is the area occupied by the wood panel on which the PGM program is carried out.
Progr. PGM : is the name of the file which contains the machining instructions for the piece in question. This information together with the **Area** information gives a univocal description of the piece being processed. In the example above *pippo.pgm* could be the program to work on a door: in area A it produces a right hand door while in area B it produces a left hand door (A and B are mirrored) and the operator could give each process a different code.
Dimensions : dimensions of the wood panel to be processed, length x width x height (dX x dY x dZ).
Start time : is the time machining started expressed in hours:minutes:seconds. This is timed from the moment the head leaves the rest position or has just finished working on a piece from a different job.
Finish time : is the time all working stops on all pieces (see **Quantity** field) needing to be processed.
Teff.: is the total actual working time taken by the machining head for the job in hand.
Ttot.: is the machine overall working time for the job in hand.
Quantity : the number of pieces to be processed during the job.
Average Time : the average time between the actual total Teff divided by the **Quantity**, expressed as before in hours:minutes:seconds..
Description : each PGM file contains in the first instruction of program Header, a text field which gives a summarized description of the program. This information is to be written in the column.

Following is a description of how to calculate the time work starts, but above all the time it finishes and the Teff and Ttot times. The problem is understanding how to allocate the total utilization time for the machine amongst each of the processes which the machine performs.
Certain operations can in fact be *concurrent*, that is to say more than one PGM program can be run on the same machine: there are indeed different work areas and these can be occupied by a single PGM (and relative panel), used in pairs or all four used together.

If we therefore run the file pippo.pgm in areas A and B and each of these has to process 5 pieces at the same time (or rather the heads have been reserved by both areas), the working time graph for that head will be as follows :



In which the following quantities are identified :

t_{A0} = pippo.pgm **Start time** in area A;
t_{B0} = pippo.pgm **Start time** in area B;

Once machining has started in A, the **Start time** (t_{A0}) field is known and in that precise instant the chronometer starts in order to calculate the working time in A: at that moment t_{A1} is stopped because, once the first piece is completed, control passes to the head in B and so the chronometer is stopped until t_{B1}, the moment the second piece in A starts, it is then started again until t_{A3} and so on until all the pieces in area A have been completed. The same procedure applies to the machining operations in B.

This means that when processing a piece, the time interval Δt (time taken for the machining head to move from one area to another) is ascribed to the machining of the following piece, and so:

$$\textbf{Ttot(A)} = (t_{A1} - t_{A0}) + [\Delta t'' + (t_{A3} - t_{A2})] + \ldots + [\Delta t^n + (t_{An} - t_{An-1})]$$

$$\textbf{Ttot(B)} = [\Delta t' + (t_{B1} - t_{A1})] + \ldots + [\Delta t^n + (t_{Bn} - t_{Bn-1})]$$

Therefore, the less distance between the working areas, the less actual working time wasted due to the head moving from the area where it has just finished working to the next where it has to start another operation.

With reference to the graph above, the **Teff** value means the **effective** working time the machining head is in use (for example) for the machining operation pippo.PGM in area A:

$$\textbf{Teff(A)} = (t_{A1} - t_{A0}) + (t_{A3} - t_{A2}) + \ldots + (t_{An} - t_{An-1})$$

$$\textbf{Teff(B)} = (t_{B1} - t_{B0}) + \ldots + (t_{Bn} - t_{Bn-1})$$

It therefore represents the total working time, as if the head had been assigned to just one work area.

As well as the above lines, the Production Report also contains one more line (as a file, at the head of the file itself) with a summary of the information contained in the other lines (the totals line):
Eff. Time Total: is the total effective machine time calculated as the sum of all **effTs** for all jobs carried out during the day;

Total no. of Panels : is the total number of the panels completed during the day.

Lastly, after the total line there is a line containing the name of the operator that carried out the production (can be entered with the **CONTROLS/ENTER OPERATOR NAME MENU). THE NAME OF THE OPERATOR CAN BE SET TO ACCESS THE ENTRY WINDOW.** The maximum number of characters accepted is 16.

Internal Format of Production Report

The internal file format is of the text (ASCII) type with the extension *.pro*. The different lines that go to make up the table in the example shown previously will be entered in the following way:

// Totals line
(Total time),(Total no. of panels)CRLF

// Declaration of current operator
#OP,(Name Operator – max 16 characters)

// Job 1
(Area),(Progr. PGM),(Descr.),(Dimensions),(Start time),(Finish time),(effT),(totT),(Quantity),(Av. Time)CRLF

// Job 2
(Area),(Progr. PGM),(Descr.),(Dimensions),(Start time),(Finish time),(effT),(totT),(Quantity),(Av. Time)CRLF

// Job 3
(Area),(Progr. PGM),(Descr.),(Dimensions),(Start time),(Finish time),(effT),(totT),(Quantity),(Av. Time)CRLF

…..

// Job n
(Area),(Progr. PGM),(Descr.),(Dimensions),(Start time),(Finish time),(effT),(totT),(Quantity),(Av. Time)CRLF

With the individual line which will be made up of :

hh,mm,ss,(Total no. of panels) CRLF
(Area),(Progr. PGM),(Descr.),dX,dY,dZ,hh,mm,ss,hh,mm,ss,hh,mm,ss,(Quantity),hh,mm,ss,cc CRLF
….

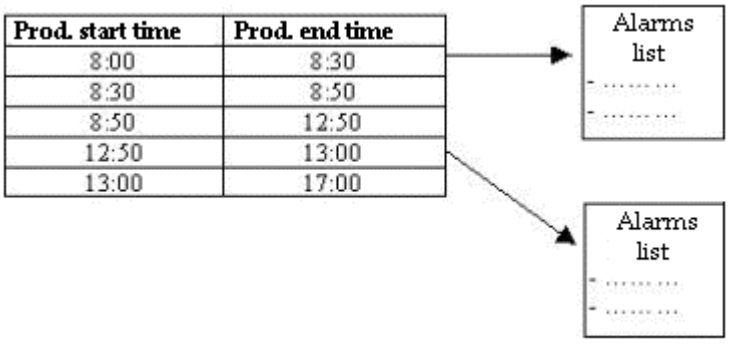
Sizes of the individual fields :

Field	Max. no. char	Example
(Total time)	2,2,2	hh,mm,ss
(Total no. of panels)	5	(max 65567 pieces)
(Area)	2	AD
(Progr. PGM)	256	(long file name in Windows 95)
(Description)	256	(general string)
(Dimensions)	8,8,8	XXXX.XXX,YYYY.YYY,ZZZZ.ZZZ
(Start time)	2,2,2	hh,mm,ss

(Finish time)	2,2,2	hh,mm,ss
(effT)	2,2,2	hh,mm,ss
(totT)	2,2,2	hh,mm,ss
(Quantity)	5	(max 65567 pieces)

6.3 Diagnostic Report

The Report will show a series of data regarding the way the machine works during use, set out in the following way:



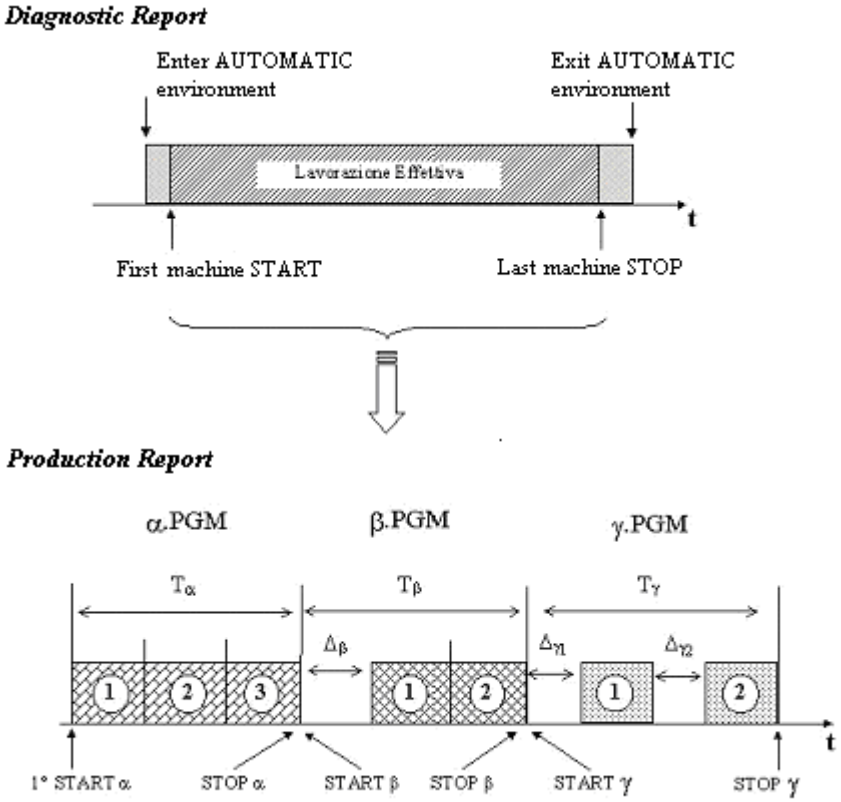
Internal Format of Diagnostic Report

The internal file format is of the text (ASCII) type with the extension *.dia*. The different lines that go to make up the table in the example shown previously will be entered in the following way:

START PROD,(Time Event),(Name Operator)CRLF // Start production from operator …
STOP PROD,(Time Event)CRLF // Stop production
START ALRM, (Time Event)CRLF // Alarm
ALRM, (alarm 1 description)CRLF
ALRM, (alarm 2 description)CRLF
….
ALRM, (alarm n description)CRLF
STOP ALRM,(Time Event)CRLF // Stop Alarm : resume normal production
START PROD,(Time Event),(Name Operator)CRLF // Start production from operator …
…..
STOP PROD,(Time Event)CRLF // Stop production

With fields **(Time ..)** in the form «hh,mm,ss» while the field **(alarm N description)** is a string with a maximum of 256 characters and the field (Operator Name) is a string with a maximum of 16 characters).

6.4 Time Comparison between Diagnostic Report and Production Report



Lets imagine a hypothetical process composed of three pgm files (α.PGM, β.PGM, γ.PGM); now lets evaluate the characteristic time intervals for the two reports created (N.B. : we have assumed there are no reservations between the three PGMs, if we were to consider these, the various cubes of the three PGMs would be mixed up together and we would refer to the previous considerations):

$Teff_\alpha = T_\alpha$; $Teff_\beta = T_\beta - \Delta\beta$; $Teff_\gamma = T_\gamma - \Delta_{\gamma 1} - \Delta_2$;

of which :

Ttot $= T_\alpha + T_\beta + T_\gamma$; **Teff.tot.** $= Teff_\alpha + Teff_\beta + Teff_\gamma$;

APPENDIX

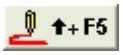
APPENDIX A. Menu and Toolbars

Operating Environments

File Menu

Editor		Launches editor execution for Xilog Plus programs.
Open CNC file		Opens CNC files in the appropriate editor.
Load PGM		(Automatic) Queues a program when execution is active.
Carried out automatically		(Automatic) Start an execution session.
Machine configuration		Opens the editor for machine parameters.
Exit		Exit Xilog Plus Machine Panel.

View Menu

Alarms		Opens window that displays alarms
Input/Output		Opens input and output window from PLC.
Quote axis		Allows selection, from a list, of methods for displaying axis quotas.
Animation		(Automatic) Shows program animation during execution.
Suction cups position		(Automatic) Displays the programming of the work table. If the current table for the current program has not been programmed, this command is disabled.
Graphic simulation		(Automatic) Shows graphic simulation of a program during execution.
Editor ISO		(Automatic) Opens program editor in ISO format..
Mix		(Automatic) Opens window to change mix during execution.
Report file		Opens management window for report files.
ISO Block		(Automatic) Opens the window that displays program blocks during execution.
Tool Change		(Automatic) Displays the too change window during program execution.
Controlling CNC file		Makes it possible to communicate from the Machine Panel directly with the files contained in the C.N. With buttons: **EXIT, IT IS POSSIBLE TO EXIT THE CN FILE MANAGEMENT WINDOW;**

	DELETE, the CN deletes selected files from the list; **SEND,** it is possible to send files that reside on the Personal Computer to C.N control. This window is only displayed if the CN is connected to the Personal Computer.

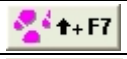
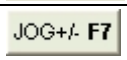
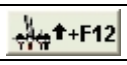
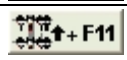
Select Menu

Previous axis	Selects the previous axis from the window that displays the axis quotas.
Next axis	Selects the next axis from the window that displays the axis quotas.
Previous field	(Automatic) Selects the previous field in the synoptics of fields.
Next field	(Automatic) Selects the next field in the synoptics of fields.

Mode Menu

Automatic	Selects the Automatic operating environment.
Manual	Selects the Manual operating environment.
Setting	Selects the Calibration operating environment.
MDI	Selects the MDI operating environment.

Controls Menu

Change repetitions		(Automatic) Allows the number of program repetitions to be changed.
Enable reading of BCR		(Automatic) Enables/disables reception from BCR.
End execution		(Automatic) Terminates current execution.
Simulated mode		(Automatic) Activates execution in simulation mode.
Step-step mode		(Automatic) Activates execution in step by step mode.
Dry run test mode		(Automatic) Enables the execution in dry run test mode.
Flap test mode		(Automatic) Enables the execution in flap test mode.
Change Jog		(Manual) Enables JOB value to be set to manually move the axis.
Reset CN		Sends a Reset command to the CN.
Test Spindles		(MDI) Accesses manual tests for boring and milling units.
Test Tool Change		(MDI) Accesses tool store tests.
ISO Commands		(MDI) Activates MDI controls from the keyboard.
Handling tool room		(MDI) Opens the window for managing the Tool Room store.

Input operator message	(Automatic) Opens the box for entering the data; the value entered must be confirmed with the **[ENTER] KEY.** **A FLASHING ICON SIGNALS THE NEED TO ENTER DATA. ANY VALUES ENTERED WHEN THERE IS NO NEED, WILL NOT HAVE ANY EFFECT.**
Input operator name	Makes it possible input the name of operator who will carry out the production (maximum 16 characters). The name will be used when producing diagnostic and production reports. When Machine Panel starts the name of the operator is cancelled.
Paddle	Shows the "Paddle" pushbutton panel.

Tools Menu

International settings	Opens the window for setting the language and unit of measure (millimeter or inch) used by Machine Panel.
Date/Hour	Opens the window for setting date and time. The window header contains the number of hours Machine Panel is used. If the C.N. is NUM® and, only if enabled, there is a selection that concerns date for substituting the battery of the C.N. In this case, after substituting the battery, enter the date in the relative fields.
Calculator	Displays the scientific calculator (See: Appendix H).

Help Menu

Guide topics	Opens the on-line Help window. Online Help can also be activated by pressing the key **[F1]**: this will display all help topics available for the item selected.
About Machine Panel	Opens the information window: the version number for Machine Panel and for the software in the PLC installed on C.N.

Worktables Editor

File Menu

Print...		Prints active table program.
Print preview		Provides a print previews.
Set up printer...		Changes printer settings.
Exit		Closes the editor.

View Menu

Toolbar...		Shows/hides the toolbar selected from the list.
Restore original Toolbars		Reset original toolbar arrangement.
Show/Hide PGM Origin		Shows/hide the panel reference system.
Show/Hide Machine Origin		Shows/hide the machine reference system.
Show/Hide crosspiece display		Show/hide crosspiece diplays.
Panel to front		Shows the panel in the foreground.
Activate Light Draw		Shows the work table in simplified graphics.
Full screen		Activates/deactivates the full screen view.
Show/Hide ID		Show/hide support identifier.
Disable laser cross		Close disply of laser cross programming bar.

Select Menu

Previous support		Selects previous support.
Next support		Selects next support.

Menu ?

Help topics		Opens the on-line Help screen.
About EPL…		Displays information on the program, the number of the version, and copyright information.

Toolbar

	Shows/hides panel reference system.
	Shows/hides machine reference system.
	Show/hide crosspiece diplays.
	Shops panel in foreground.
	Shows work table in simplified graphics.
	Activates/deactivates full screen display.
	Allows the work table image to be enlarged or reduced: - click on the left mouse button: the image is enlarged;

	- click on the right mouse button: the image is reduced. The zoom is centered on the clicking point.
	Allows a rectangle to be drawn by dragging the mouse over the drawing: when the mouse is released, the area inside the rectangle is enlarged.
	Enlarges the area occupied by the panel.
	Resets the original size of the drawing.
	Selects previous support.
	Selects next support.
	Prints active table program.
	Show/hide support identifier.
	Displays information on the program, the number of the version, and copyright information.
	Enables the search for topics in the on-line Help guide. The cursor turns into an arrow with a question mark: by clicking on the desired point, the relative guide topic will be displayed. The feature may also be activated using the key combination **[SHIFT]**+**[F1]**.

Status Bar

The **area to the left,** when the moving over them with the mouse, the status toolbar describes the actions of the menu items and buttons on the toolbar.

To the **right** there are boxes that show the coordinates for the point where the cursor is located compared to the panel starting point (OP) and machine starting point (OM).

To the **extreme right** of the toolbar there are three boxes that indicated whether the following keys are blocked.

MA The Caps Lock key is blocked.
NUM The Num Lock key is blocked.
BS The Scroll Lock key is blocked.

Report

File Menu

Open	Opens a report
Print	Sends a report to print
Print setup	Sets up the printer
Exit	Exits the report display window.

Graphic Simulation

Profile Menu

Display		Displays current work from the beginning.
Run		Runs graphic simulation.
Printer setup		Sets up the printer
Exit		Exit the graphics simulation window.

View Menu

Toolbar		Displays the toolbar.
Status bar		Displays the status bar.
Data		Displays the table containing work data.
Configuration		Enables personalization of graphic display.

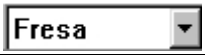
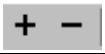
Setup Menu

Parameters		Table of parameters for calculating times.

Menu ?

Window information		Opens an information window on the program that manages graphic display.

Toolbar

	Displays current work from the beginning.
	Centers the graphic figure.
	Rotates the graphic figure in three dimension.
	Forward/play/pause keys.
	Drop-down menu with list of work outlined.
	Zoom keys
	Displays the table with work data (space, execution time, etc.).
	Table of parameters for calculating times.
	Personalizes graphic display.
	Opens an information window on the program that manages graphic display.

CNC/ISO File Editor

File Menu

Open	Opens an existing document.
Save	Saves a document.
Save as	Saves a document and allows name change
Print	Prints a document.
Print preview	Displays a print preview of document.
Printer setup	Enables printer to be set up for printing.
Exit	Exits from editor.

Edit Menu

Cut	Removes selected data from the document and stores it in Clipboard.
Copy	Copies the selection in Clipboard.
Paste	Enters the contents of the Clipboard (cut or copied with one of the two previous commands) into the insert point.
Delete	Deletes selected data.

Tools Menu

Calculator	Displays the scientific calculator (see: Appendix H).
Graphic display	Opens the graphic display, is available.

APPENDIX B. Status Bar

The status bar is displayed on the lower part of the Machine Panel window. In this area the operator has the status of the machine always under control, since it immediately highlights any change in status and machine functions by providing the following information:

- interface status (**central area**);
- C.N. status (**central area**);
- status of physical keyboard (**area to the right**).

The **central areas** of the status bat indicate if the following keys are blocked:

mm in	Shows whether the unit of measure is mm. or inches.
	The machine is not calibrated.
	Automatic execution from BCR enabled/Reading from BCR enabled.
	Presence of alarms or operator messages.
	Automatic program execution active.
	Automatic circular mix execution active.
	Automatic execution of mix with circular countdown active.
	Automatic execution of mix with sequential countdown active.
	Execution by supervisor active.
	C.N. connected to serial port COM1.
	C.N. connected to serial port COM2.
	C.N. connected to serial port FIP.
	Automatic execution in step by step mode active.
	Automatic execution in simulated mode active.
	Presence of message to operator with without request for input.
C.N.?	C.N. not connected.
HOLD	C.N. in HOLD status.
AUT	C.N. in AUTOMATIC status.
EXEC	C.N. executing an ISO program.
MAN	C.N. in MANUAL status.
MDI	C.N. in MDI status.
M02	C.N. default status (REST).
RAP	C.N. in RAP status
REF	C.N. in axis calibration status.
SEQ	C.N. in SEQ status.
RESET	RESET sent to CN.
JOG	Unlimited axis movement.
1 ... 10000	Axis movement by step from 1 to 10000 mm. depending on the value shown in the figure.
	NC axis unit selected (for RD260 multi-unit version and Ergon).
Z1 ... Z9	Number of master Z axis active (refers to NC axis unit selected).

The **areas to the right** of the status bar indicate whether the following keys are blocked:

MA	The Caps Lock key is blocked.

NUM	The Num Lock key is blocked.
//F10	Key **[F10]** enables RESET to *C.N.*

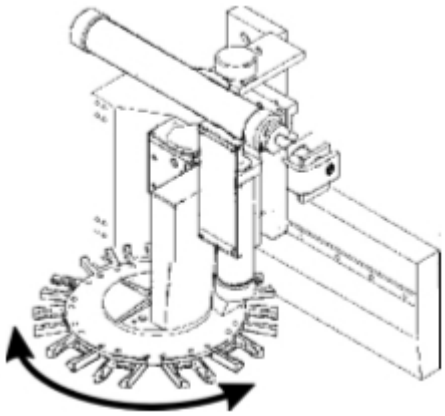
APPENDIX C. Remote Control Device (Mobile Cone)

A Axis selector
B Potentiometer for adjusting axis speed during working
C Potentiometer for manually adjusting axis speed
D Button (-) to manually move axis
E Button (+)to manually move axis
F Button (F1) to confirm tool loading/unloading
G Button (F3) to manually raise stops
I Button for blocking-Unblocking cone ISO30
K Button (F2) for unblocking motor brake for axis Z (to be used at the same time as the STOP L button)
L STOP button
P START button
Q Button for manually lifting the intake hood of he Rapid 10 unit
S Dual position selector for activating the SETTING mode
V Mushroom-top emergency button
X Tri-position selector for NO EDIT – NO MODE

APPENDIX D. Tools Store

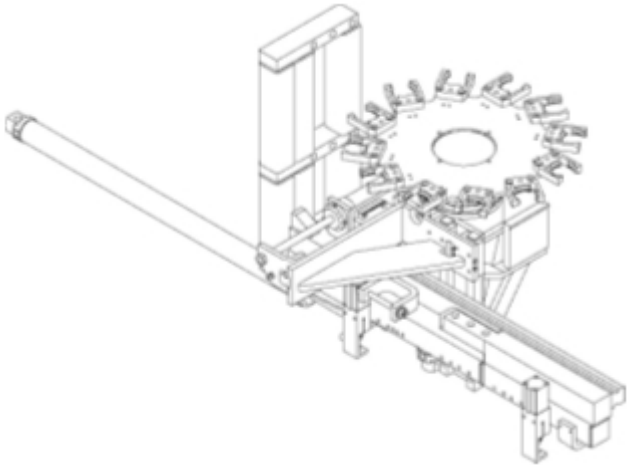
Rapid Type Rotating Store

This wheel can have 6, 8, 10 or 14 positions. This type of store is mounted on a head to be bored which therefore allows a masked tool change; it is mounted on all Rapid type models. The position of the tools on the wheel are specified by the adhesive label which shows the position number on the rotating store.



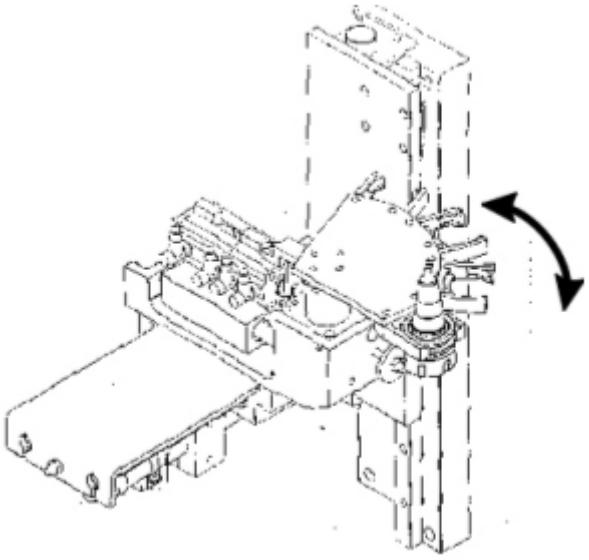
Tool Room Store

This type of store is mounted on the rear of the machine cart, while in the front we have the Rapid store. When a program is launched for execution, the electro-spindle pre-loads the tools to be used by the Tool Room into the Rapid store.



Random Store

A random store can have 4 positions and is mounted on axis X; the C.N. manages tool loading and unloading, based on the positions available. Normally the system has a minimum of 2 electro-spindles.

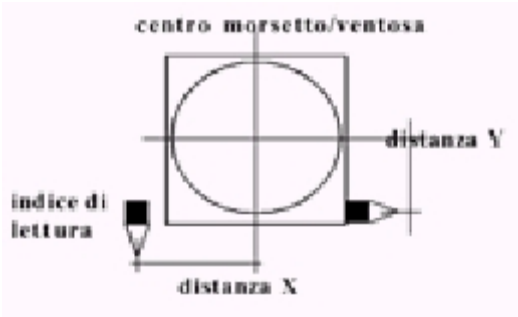


APPENDIX E. SEPRI Quota Displays/Indicators

The use of these devices requires that some settings be made inside the Xilog Plus configuration file:

- **supports.cfg**

Set offset values ("Offset X quota of crosspiece" and "Offset Y quota of suction cups" parameters) for the quota indicators on the metric lines, with respect to the clamp/suction cup center. The values to be entered into the offset parameters are calculated by appropriately calculating the Xilog Plus origins and the values of the mechanical distance between suction cup center and reference index, in the direction X and Y (fig. 1).



mm.	distance X	distance Y
TV SCM surface	42,5	60
TV Schmaltz surface	66,5	0

Fig. 1 Distance between suction cup center and reference index in X and Y direction; this distance is useful for calculating the offset value.

- **xilog3.cfg**

Set the type of positioning management for the elements on the table (manual)

"Table" parameter = **1**

Set the serial line used and select the transmission protocol.

"Number COM Automatic Suction cups`" parameter =

for VIS SEPRI	**10 (COM1)**	for VIS LIKA-SIKO	**20 (COM1)**
	11 (COM2)		**21 (COM2)**
	12 (COM3)		**22 (COM3)**
	13 (COM4)		**23 (COM4)**

Procedure to use the positioning of the bars and the vacuum cups on the RD130 STV and RD240 TV.

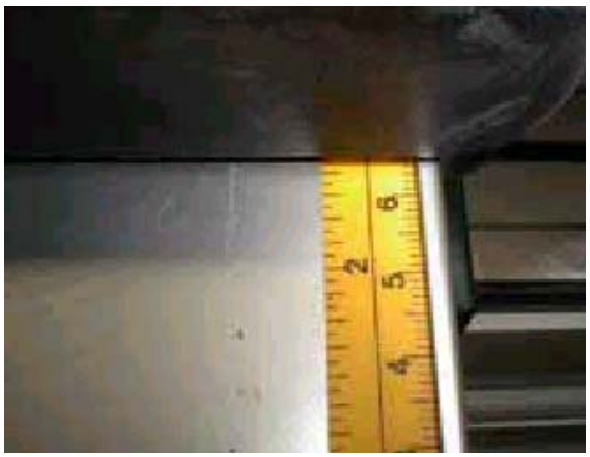
1. Select the Xilog Plus editor program.
2. Position the bars and suction cups with the bar and suction cup editor.

3. Activate the program in Machine Panel Automatic environment.
4. Set V field in the Header at 11 (V=11).
5. Press the **Start** key: the quotas will be transmitted to SEPRI viewers on the bars.
6. Press the SEL key until the letter H appears.

7. Manually position the bar at the quota indicated.

8. Press the SEL key until the number 1 appears.

9. Manually position suction cup 1 at the quota indicated.



10. Repeat the operation for all the bars and suction cups involved in the process.

APPENDIX F. Nesting Cell

Nesting Cell with Automatic Martyr Panel Return or Swinging of the Same

With this machine model it is possible to chose working with the standard table (multifunctional table) or with the Nesting equipment, by means of a key on the electric box of the machine. After having chosen the new machining system with the key, the machine must be switched off and then on again (the change of status is only recognised by the CNC during initialisation).

The Nesting version of the machine requires the following changes in program management:

a) with a loading roller and an unloading roller (fixed, single direction cycle):

- If a program is executed in field AB or BA, the panel will be loaded from the roller univocally defined in fixed "load" mode and unloaded from the similarly univocally defined roller defined "unload".

b) by the load/unload dynamic rollers upon program variation:

- the programs can be executed in field AB or BA.
The panel will be loaded from the left roller (and unloaded on the same roller with the following cycle, if swinging execution is present in the other field CD or DC, or, if unloading is requested with the NESTING instruction, see below.)
- The programs can be executed in field CD or DC.
The panel will be loaded from the right roller (and unloaded on the same roller with the following cycle, if swinging execution is present in the other field BA or BA, or if unloading is requested with NESTING instruction, see below.)
- If a program is executed in field AD the panel will be loaded from the left roller and unloaded from the right roller.
- If a program is executed in field DA, the panel will be loaded from the right roller and unloaded from the left roller.

If the number of repetitions (R) is greater than 1, the program will be ended only at the end of the repetitions, without the operator having to give other **Start** commands.

If the number of repetition (R) is greater than, the program will be ended only at the end of the repetitions, without the operator having to give other **Start** commands.

Every program must have the NESTING macro recall as the first instruction and the vacuum command must be disabled with V=0. The blocking and unblocking of the vacuum and the sheet of air are completely automatic without use of selectors.

Nesting Cycle

The Nesting loading cycle is divided into various states connected by conditions and controls.

1. The machine positions at X=0, raising the side flap and the loading zone reference stops.

2. Once in the load position, the operator can use the pedal to block the new piece with the clamps positioned on the vertical frame.
3. If the piece is properly blocked and the loading zone is clear (presence photoeye), the **Start** buttons on the tower will flash and are enabled to give the start command for loading the panel.
4. Press **Start**, the stops and the flap descend, the machine with the new panel approaches the panel on the table, and the sheet of air is enabled.
5. Once the proper pressure has been reached, the X axis brings the new panel into machining position; consequently, the previously machined panel is unloaded onto the opposite roller.
6. Once the machining position has been reached, the sheet of air is disabled and the vacuum blocking action is enabled.
7. The piece is blocked into place and the clamps are opened so that the piece program can be run.

A new load cycle may be executed only if there has been a decrease in the number of pieces, therefore at the end of a program. If, for instance following an interruption of the program, the operator wants to restart the Nesting cycle, he must write the M2 code (program end code) in MDI, or else force parameter E30019=0.

Code M

M 100 Nesting load cycle, recall sub-program %8100
M 99 Nesting unload cycle, recall sub-program %8100
M 37 Enable and block vacuum
M 27 Enable sheet of air
M 92 Flap high
M 93 Flap low
M 94 Close Nesting clamps
M 95 Open Nesting clamps

Calibrating Nesting pressure-vacuum switches

P1 .050 bar
P2 .005 bar
P3 -.350 bar
P4 -.400 bar

Programming with Xilog Plus

1. This must always be written at the beginning of a program:

NESTING Q=0 G=0 Enable Nesting load cycle (the same as code M100).

2. Panel machining.

3. This must always be written at the end of a program:

NESTING Q=1 G=0 Enable Nesting unload cycle with clamps (the same as code M99)

or

NESTING Q=1 G=1 Enable Nesting unload cycle with new martyr panel (the same as code M99)

Automatic loader – AMS – (automatic martyr return)

Operator Panel

Key 7: Automatic Mode
Key 8: Manual Mode
Key 9: Setting Mode (password 3 5 7)

The two Hand-held controls are enabled and the control (black key) is used to run the load and unload cycles in input and output from the loader. The **[SHIFT]** key is used to access the manual pages.

Nesting Cell with the simple “Reverse Flow” option

The key selector on the electric panel is used to select the machining mode.

Position 0 = vacuum mode: single or unique work areas (like a standard machine).

Position 1 = Nesting mode: only unique work area, possibility of directly blocking the piece by using a blocking selector (first blocking must be enabled with M58) or of enabling the blower by using the button on the edge of table.
When the button is pressed the blue light on the button turns on and the light on the pulpit begins to flash, indicating that we are ready for the blower.
Then use the blocking button to enable the blower; the light on the pulpit stops flashing, while the blue light remains lit; then use the unblocking selector to turn off the blower and the blue light turns off. Now the piece can be blocked with the vacuum (first blocking must be enabled with M58) or reactivate the blower by pressing the blue button. The next time the blocking action is used, the machine returns to the starting point.

The machine is set to read the status of the key only upon start-up: in order to change the work mode, the key selector must be first positioned on the desired mode and then reset the CNC.

Two messages have been entered:

MSG29 “NESTING ERROR” indicates an error due to:
a) incorrect programming in the work areas
b) no blower signal inserted from the pressure-vacuum switch on the table, timer 4 seconds.

MSG30 “NESTING CYCLE RUNNING” indicates that the blower has been inserted.

Macro Xilog Plus Nesting Management and Bar Code Labelling Machine

NESTING. Macro for loading and unloading the panel.

Parameters:

Q = operation to be executed
G = execution mode

Examples:

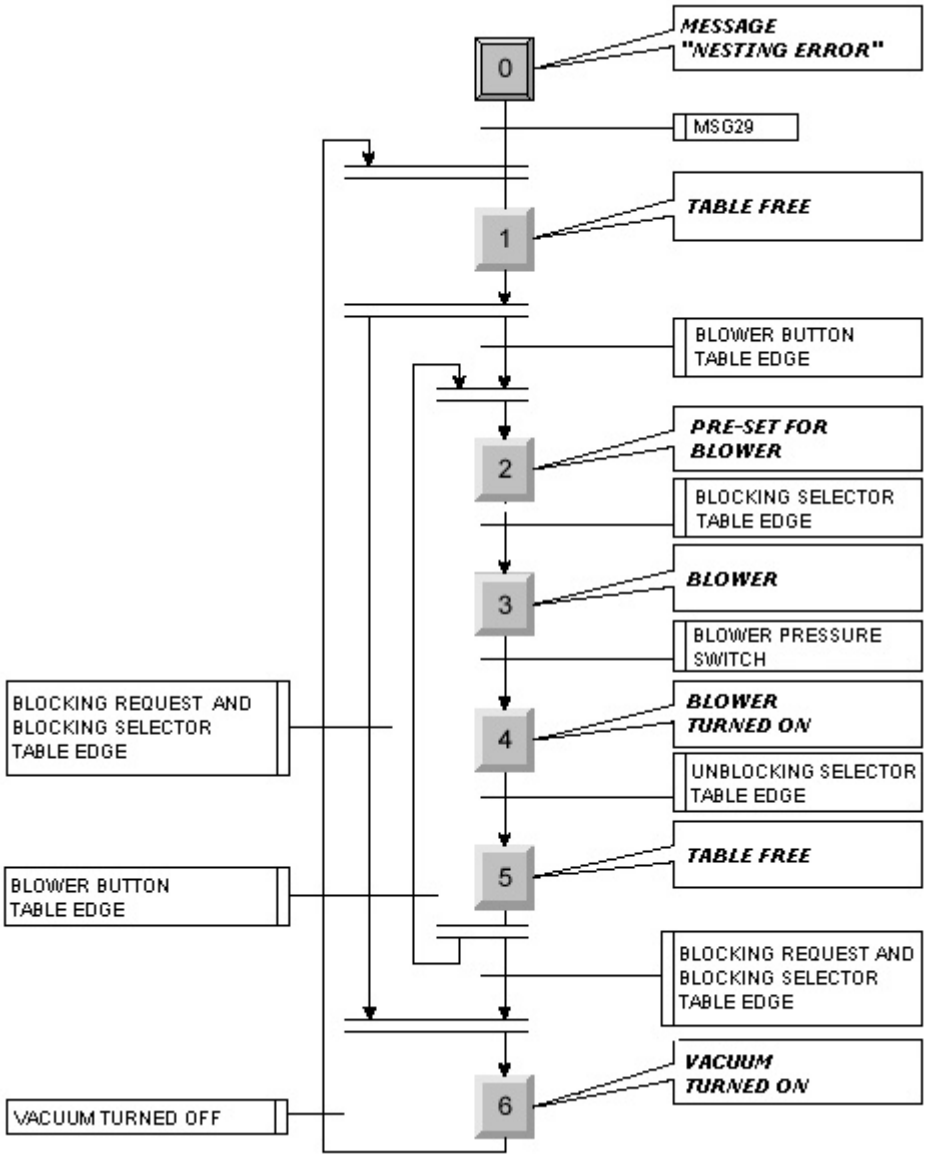
1) Q = 0 or N.P.: load panel	G: (not used)
2) Q = 1: unload panel	G = 0 or N.P. : machined piece picked up again G = 1: unload with opposite martyr.

LABEL. Labelling macro (Bar Code Labelling Machine)

Parameters:

X, Y = label position
Q = end of label (set to 1 on last label)

Nesting cycle



APPENDIX G. File Formats

Formats

CNC or i??

Formats for ISO programs. ISO programs can be edited also with an external ASCII editor. On some type of machines with NUM® controller the ISO programs can be managed directly.

FRZ

Format for mixes whose execution was interrupted during Automatic Mix status. These files can be carried out but not edited.

MIX

Standard mix format.

PGM

Standard programs format. The programs in PGM format can be exported in XXL format (ASCII format, editable with any editor) into the window for **Select program to run**; in the same window it is possible to convert the unit of measure for PGM file from millimeters to inches and vice versa.

TLG

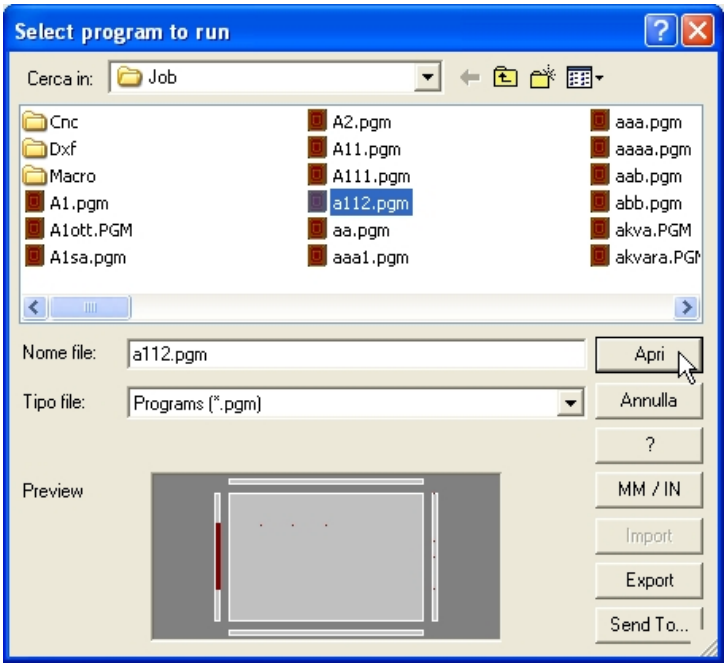
Format for tooling files.

XXL

ASCII programs format. Programs saved in this format can be edited with any text editor.

Select Program to Run Window

The **Select program to run** window of the Xilog Plus Machine Panel has some buttons with specific functions.



- **?**: display on-line Help for Machine Panel.
- **MM/IN**: converts the unit of measure in a PGM file from millimeters to inches ad vice versa.
- **EXPORT**: converts a PGM file PGM into an XXL file (that can be edited with a text editor).
- **SEND TO**: makes it possible to copy a selected program into another position in the computer or onto an external storage support (e.g. a floppy disk).

APPENDIX H. Calculator

Apart from using the calculator wit the mouse, the following keyboard functions are available (where Z is the value displayed on the screen and Y is the value stored in the calculator).

[S] X sine.
[I] X arc sine.
[C] X cosine.
[O] X arc sine.
[T] X tangent.
[N] X arc tangent.
[P] X = pi constant value.
[R] Square root of X.
[L] Delete memory: Y = 0.

APPENDIX I. NO EDIT Selector

On the control panel of the bore-milling machine there is a key-type selector that enables and disables the possibility of permanently changing or saving data contained inside a program, or the configuration of software, tooling files or ISO files. With this function disabled, it is still

possible to access the above editors, but no changes made to any open documents can be saved (access for display purposes only).