DAVI®

Controls and Commands

CONTENTS

INTRODUCTION

Leonardo Folder is a very powerful and sophisticated CNC unit, which offers several functions that help you to get the best from your folding machine.

Even if it is extremely user friendly, in order to use it at its maximum potential, it is necessary a complete training made by Promau engineers.

This user's guide just wants to be a further help for starting working with **Leonardo Folder** and the connected machine.

Leonardo CNC is a dedicated software to your machine, and it runs only with O.S. Windows® .

Pay attention to avoid system damage: do not install other applications! They may be not compatible with **Leonardo** program.

Before modifying or installing new programs, <u>always</u> contact Promau Customer Service that may inform you if and how to proceed.

CONTROL UNIT POWER OFF

<u>Before powering off machine, please read the following instruction:</u>

o   From Main Menu, click on icon [icon], located on the lower bar;

o   A dialogue box will appear;

o   Click on "YES" key and wait the program correctly stops.

Powering the machine on, it appears the following screen *(**Fig. 1**)*.
Press "Start" button to begin using **CNC Leonardo Folder**.
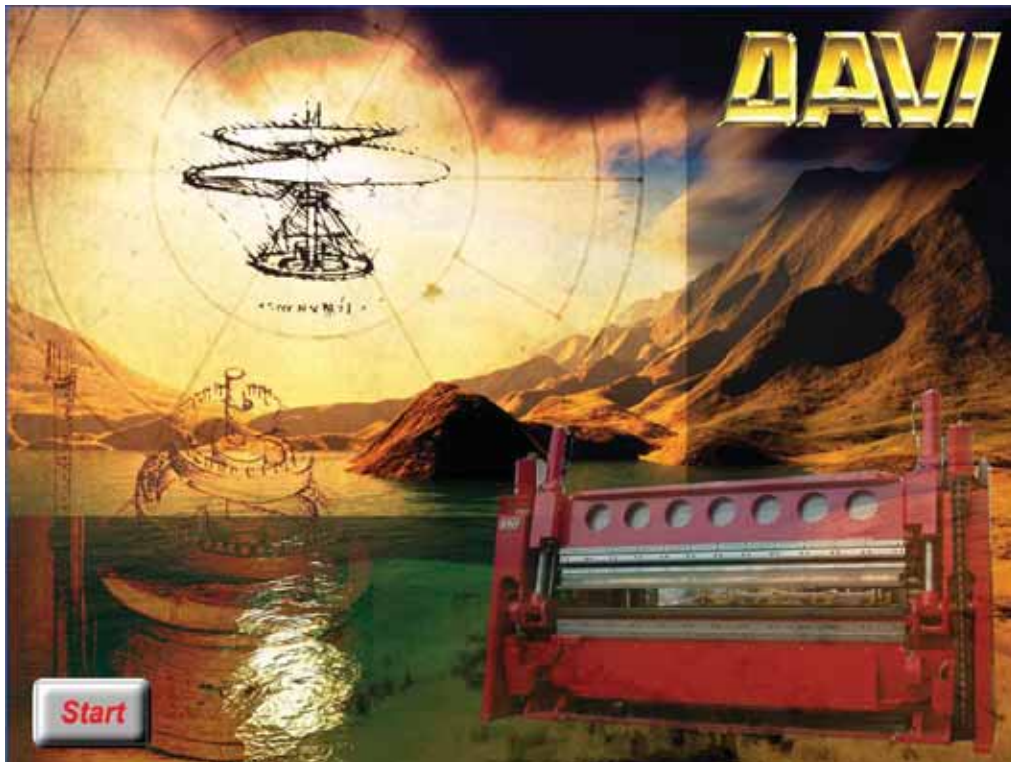

Fig. 1

LEONARDO CONSOLE

Fig 2

CNC Leonardo Folder console *(Fig. 2)* is equipped by a Touch Screen 15", by an alphanumerical keyboard with mouse.
Under the screen there are the control buttons and the emergency stop button.
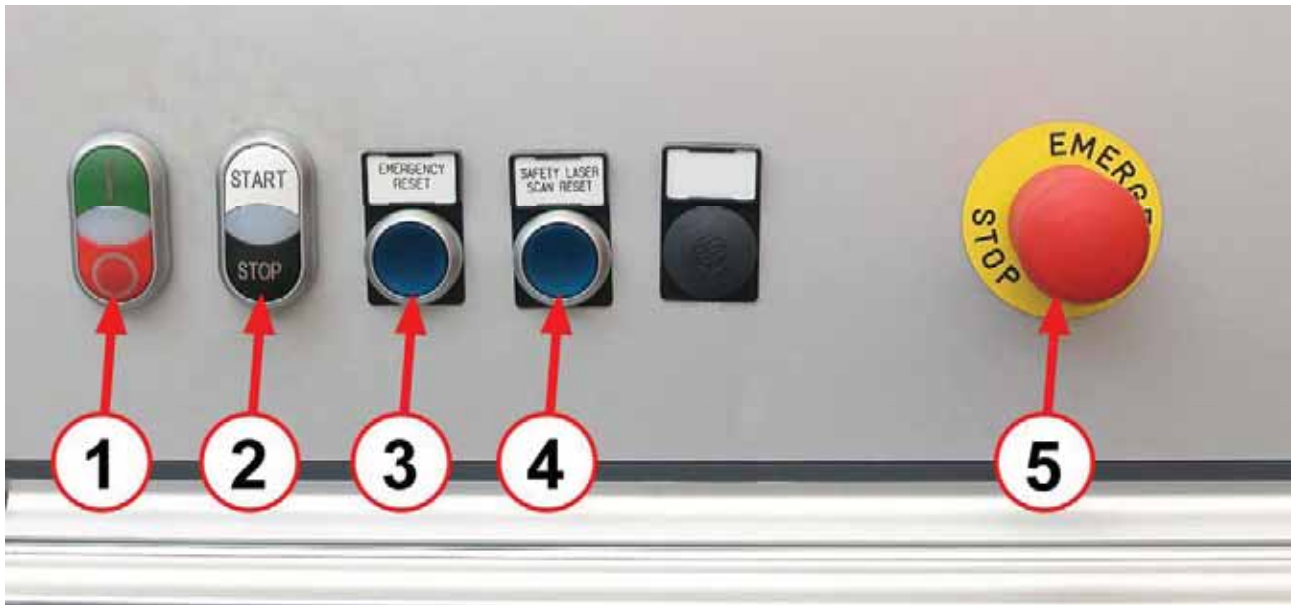
Fig 3

1	**HYDRAULIC MOTOR ON/ OFF** This button switches ON (green button) or OFF (red button) the hydraulic motor of the machine.
2	**START** It enables the program execution or the semi-automatic movement (MDI). **STOP** Pressed once, it pauses the program; pressed twice it completely stops the movement and ends the program.
3	**EMERGENCY RESET** It resets the emergency light and enables the security system again.
4	**SAFETY LASER SCAN RESET** It restores the safety laser scan and switches on the light (when it detects an object into the "emergency" zone, the button lights on and the machine stops)
5	**EMERGENCY STOP BUTTON** It should be pressed at any time a situation may appear dangerous. When you start the machine up, make sure this button is lifted up and the red light in the middle is switched off. Reset it with R button and the red light will turn off if there is any emergency enabled.

MAINPAGE

Fig. 4

This is the main menu of **Leonardo CNC**. *(Fig. 4)*
From here it's possible to access all the available options, such as Edit page, Cad, Machine Settings, Diagnostics, Production Report, etc.

Fig. 5

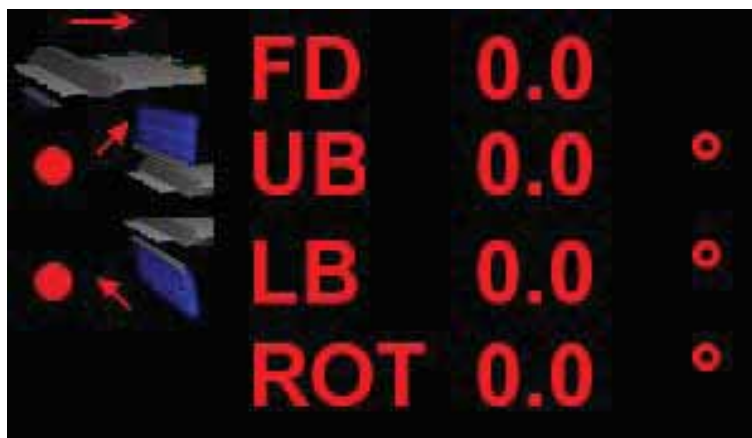In the main section of the display there are the positions of the main axes *(Fig. 5)*: the feeder (FD), the upper beam (UB), the lower beam (LB), the rotation tower (ROT) and the pressor (PR).

Besides UB and LB there are 2 pilot lights: when each beam is in "home" position, the correspondent pilot light is green lit and fixed, while if the beam is in a another position the pilot light turns red and starts blinking.
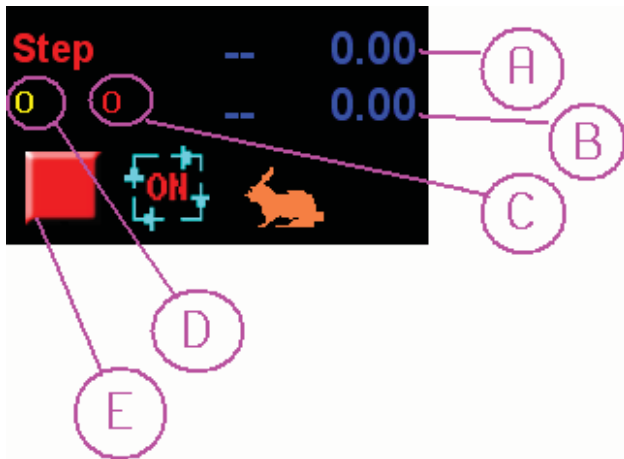
Fig. 6

A) STEP VALUE. It shows the value of the height/ position the axis currently moving has to reach.

B) STEP VALUE (FUNCTION). It shows the correspondent value of the function G or M currently selected.

C) STEP NUMBER. it shows which step of the selected program is currently in progress.

D) TOTAL STEPS. It shows how many steps there are into the current program.

E) WORKING STATUS. This icon describes 3 different machine-working status:

■ **STOP** ▶ **IN FUNZIONE** ‖ **IN PAUSA**

F) MOTOR ON/OFF. This icon shows the status on/off of the motor of the hydraulic unit.

G) RELATIVE PRODUCTION COUNTER. Here the operator can set up an amount of pieces to execute: the graphic bar besides will represent the value. At each piece done, the count decreases.

H) ABSOLUTE PRODUCTION COUNTER. It shows the total number of the produced pieces since the machine has been used the first time. Every time a piece is completed, the absolute pieces count automatically increases; when a program is interrupted before the piece has been completed, the production counter won't increase. It is not possible to reset its value.

Fig. 7

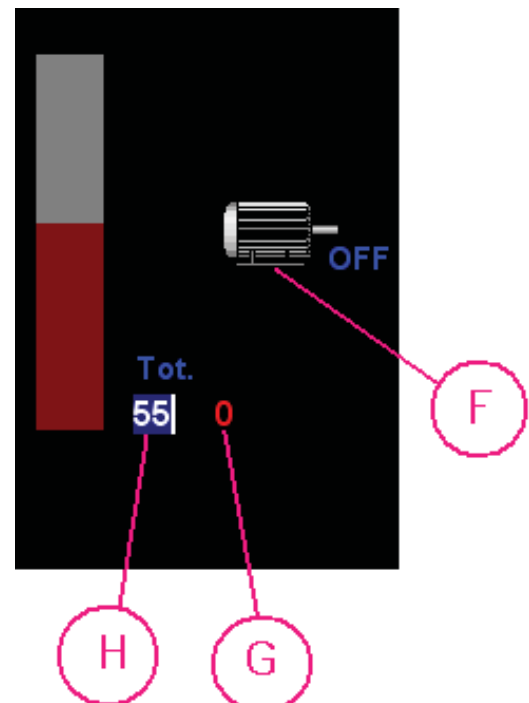**Fig. 8**

I) ROT. Pressing this button, it resets the rotation value of turret.
J) OFFSET FEEDER. To be pressed when more pegs are added on the feeder.

K) OFFSET PRESSOR. To be pressed when the extension is installed on the pressor.

Here below there is the description of the icons located around the display, starting from the first on the left:

SINGLE/MULTI PROGRAMS

Fig 9

CNC Leonardo Folder is prearranged to work by automatic working mode, that means to execute a single program at a time. Nevertheless, pressing this icon it's possible to change over the automatic working mode from Single Mode to Multi mode: in this way the machine will perform the execution of a "production list" (more programs grouped all together under a specific label).

RECIPES FOLDER

Fig 10

It opens a selection window with all the available programs.
According to the kind of working mode in use, "single" or "multi" programs, this list will refer to two different recipes folders: with "single" mode in use, the recipes folder offers only single programs; with "multi" mode running, the recipes folder shows the available production lists that are stored in **Leonardo** database.
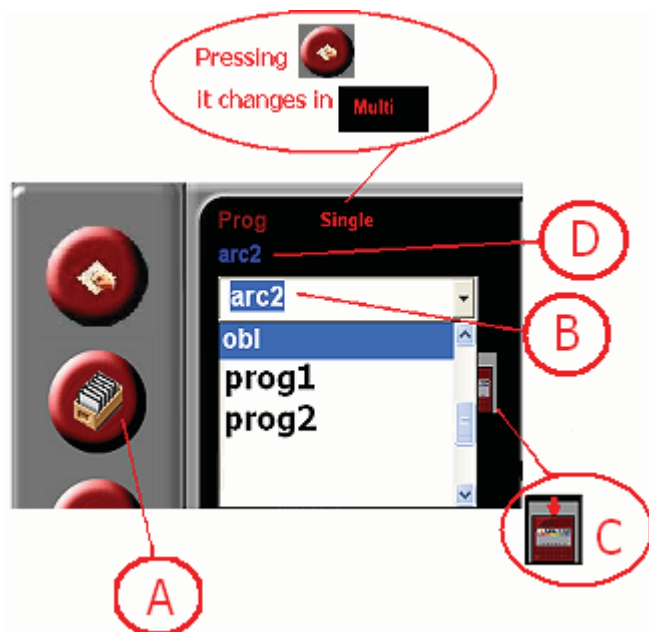

Fig 11

START A PROGRAM

1. Click on the "folder" icon (A) to access the list of the available programs. Scroll until you find the one you want to start up (B).
2. Click on its name to select and the selection menu closet up.
3. Send the chosen program to the PLC, clicking on the correspondent icon (C). The name of the program will appear written in blue (D). If the machine is working in multi programs mode, the first program to be executed will be shown and so on with the following ones.
4. Press START key on console to execute the program.

EXECUTION MODE

Permette di lavorare con tre differenti modalità:

Fig. 12

The machine completes <u>one cycle</u> of the selected program, then stops waiting to be restarted;

Step by step mode: machine will execute the program one step at once; to proceed the next step, press START button again.

Loop mode: machine keeps repeating the same program: when it reaches the end, it will automatically restart from the first step.

EMERGENCY BARRIERS

Fig. 13

To enable/disable the emergency zones there are on the machine, click on this button.

UNBLOCK TOOLS

Fig. 14

Once pressed, this button activates another button. Clicking in the middle of yellow triangle the tools on the pressor will be released. Adjust manually their position then press again the triangle button to block tools again. Press once more the activating button to remove the yellow triangle from the screen.

PRESS HERE TO RELEASE TOOLS

SPEED CONTROL

Fig. 15

Pressing this button, working speed changes from the fast mode to the slow one and vice versa.

CHRONOMETER

Fig. 16

This key activates the chronometer function.
When the program is started, it records the time it takes to complete it. Pressing "Stop" button on console, it stops taking time too. To reset it just click on "Reset" bar.
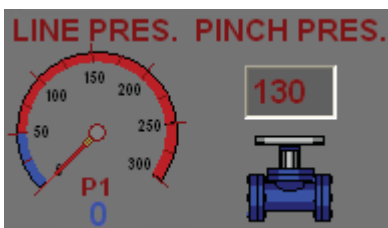

LINE PRESSURE

Fig. 17

This pressureswitch displays the pressure of the axis currently moving, both by a digital readout and both by an analogical representation.

PINCHING PRESSURE

The pinching pressure of the pressor can be set through screen control, simply keying in the required value and confirming it by Enter.
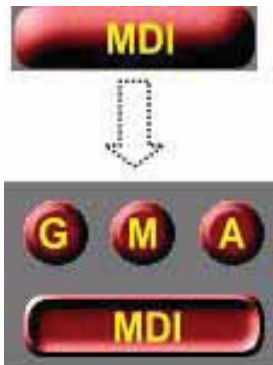
MDI (Manual Data Input)

By pressing this button, the MDI movement activates. MDI is a semi automatic movement and allows to move a single axis at time.

1) Pressing on MDI button: a selection window will appear. Choose the axis to move and eventually the function desired, just clicking on the correspondent initial (axes and functions lists are displayed by the respective buttons).

2) Click in the field beside the axis letter and set a value. Press Enter key to confirm it.

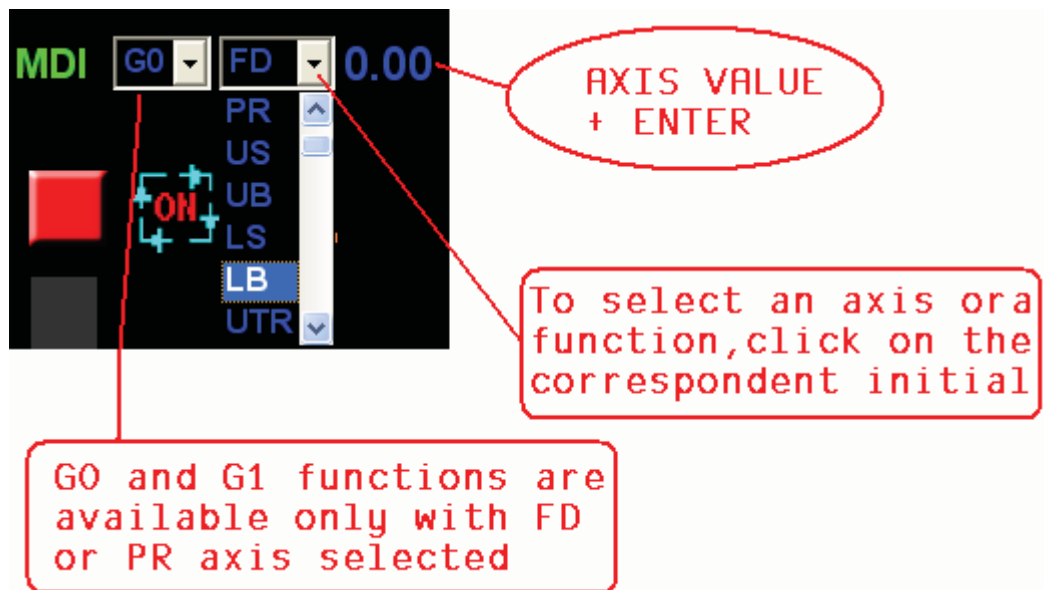1) Press the START button on console: the selected axis will move to position or the chosen function will be executed.

Fig. 18

Fig. 18b

It opens this user's guide in html format.

It runs a Notepad application on the display.

It opens a Calculator device.

Fig. 19

It opens Promau Customer Service page.

Here there are telephone number, email addresses and Promau internet site, where to download upgrades and other utilities.

Fig. 20

On the bottom bar there are the following icons, which open different pages and their correspondent functions:
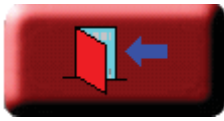

Fig 21

EXIT. In main menu, it closes the work session; in the other pages it leads back to the previous level.

Fig 22

It opens **Leonardo Edit**: from here it's possible to access **Leonardo Cad** and the Edit page where to create new programs, modify or erase programs already stored.
For further details, please make reference to the chapter at page 11

Fig 23

It opens the **Machine Settings page**.
For further details, please make reference to the chapter at page 23.

Fig. 24

It opens the **Diagnostics page**.
For further details, please make reference to the chapter at page 26.

Fig. 25

It shows the **Production Report** displayed by a bar graph.
For further details, please make reference to the chapter at page 29

Fig 26

AXES SELECTION

Axes manual selection. Pressing the arrows once at a time, the picture of the axis currently selected will appear on the spot besides.
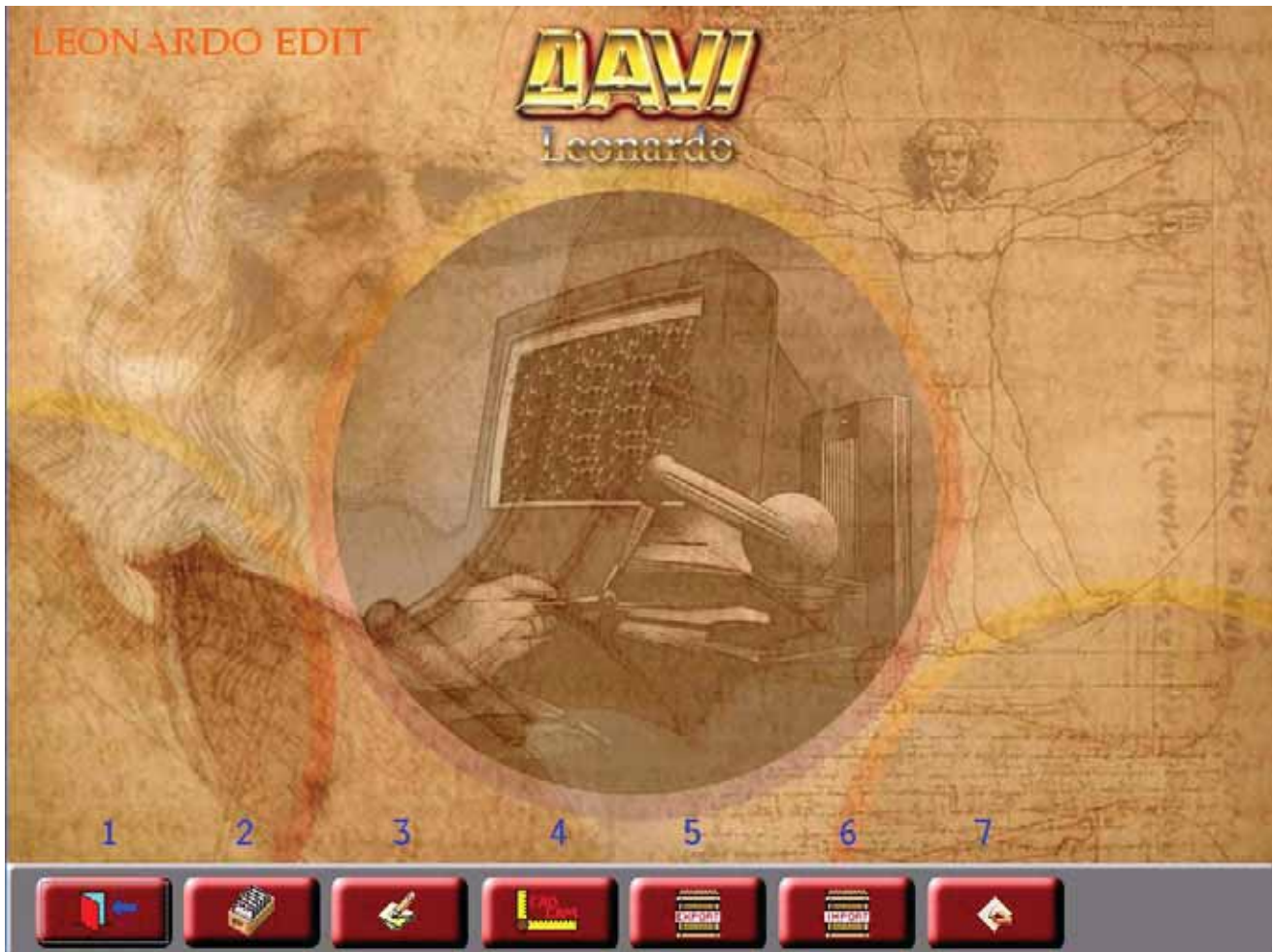
LEONARDO EDIT

Fig 28

Leonardo Edit page *(Fig. 28)* allows to enter the following functions:

1) **Home.** It goes back to main page.

2) **Programs Folder.** It contains all the programs stored in **Leonardo** database.

3) **Edit page.** It allows to create a new program: steps sequence can be up to 308 steps (there are 14 available pages and each page can contain up to 22 steps).

4) **LeonardoCad.** It allows to draw a shape and develops its program

5) **Program Export.**

6) **Program Import.**

7) **Production List.** It allows creating a sequence made of more programs to be executed by the machine in Automatic working mode.

PROGRAM FOLDER

Fig.29

Clicking on it opens a selection box on the right *(Fig. 29)* where it is possible to choose a program stored in **Leonardo** database.
Below the selection box are displayed Yield and Tensile values of each stored program..

DELETE A PROGRAM

To delete a stored program, just select it from the list into "Data set name" field then click on the icon . A dialog box will appear to confirm the deletion *(Fig. 30)*: click on "Yes".
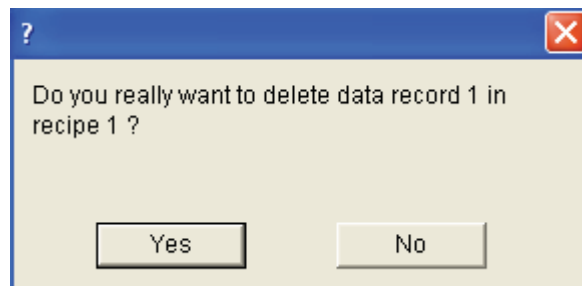

Fig.30

MODIFY A PROGRAM

To make some changes in a program, select it in **Leonardo** database, then click on the icon [icon] .

As shown here below, the correspondent steps sequence will appear *(Fig. 31)*:

Fig.31

In detail:

Fig. 32

a) **To insert a new step** among two others that have been already written, insert the number of the position in the field "Step" on the bottom, press ENTER key to confirm, then press the correspondent icon and a new line will appear just in the desired position.

b) **To delete a step**, insert its position number in the field "Step", press ENTER key, then click on the correspondent icon and the step wwill be immediately erased.

Fig. 33

To skip through Editing pages use these keys.

SAVE A PROGRAM

Once the program has been written or modified, click on the "exit" icon: it will appear the following box *(Fig. 34)* that allows to store the program into **Leonardo** database

Fig. 34

Insert a "name" (up to 17 alphanumeric characters), press Enter key to confirm, then click the "floppy" icon to store the program.
If you have just modified a program, you can save it just clicking on the "floppy" icon and the older version will be replaced by the new one; otherwise you can also insert a new name in order to keep unaltered the former program.

EDIT A PROGRAM

Open the edit page by clicking [button] in **Leonardo Edit** page *(Fig. 35):*

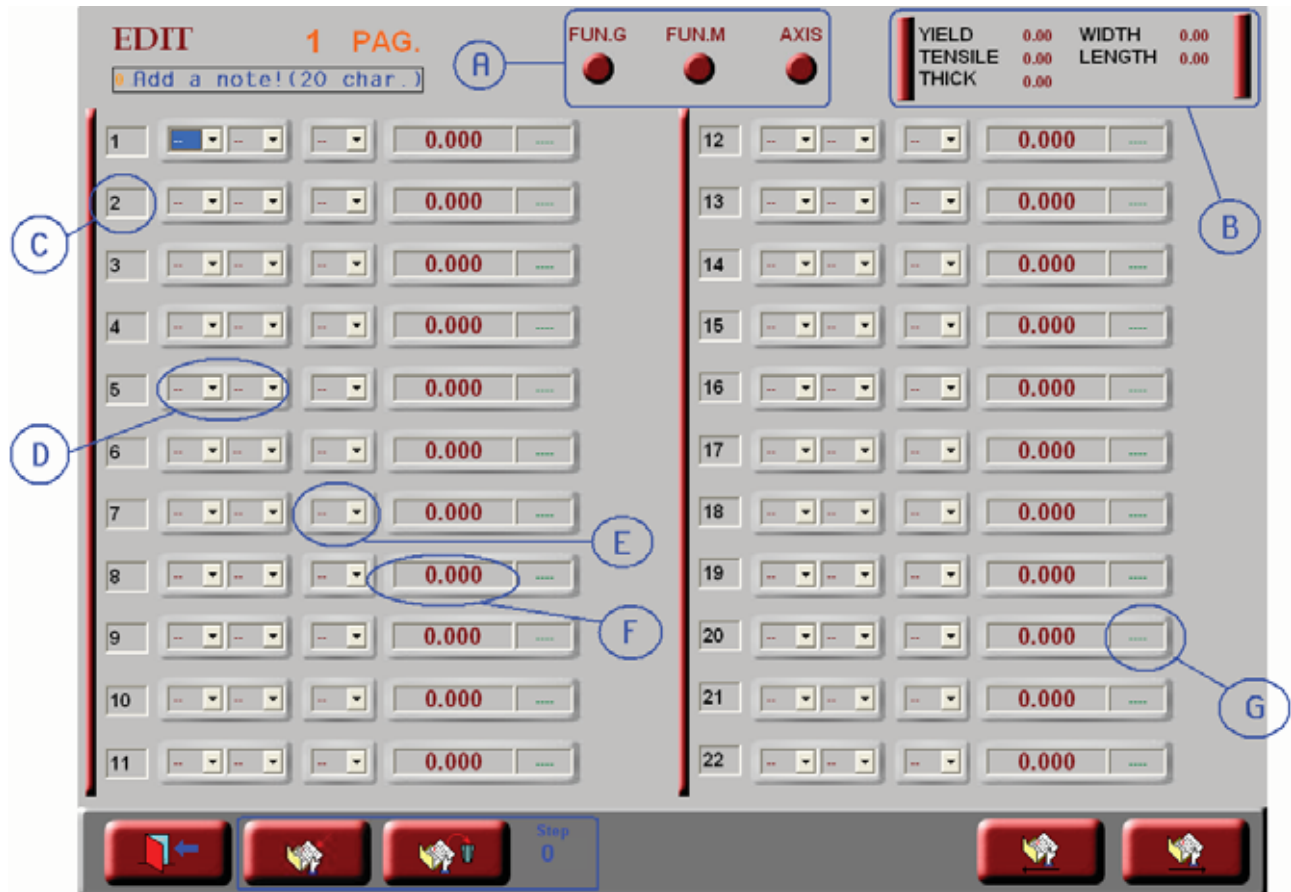**Fig. 35**

A) Axes and "G" and "M" functions lists;
B) Tensile strength and Yield point and plate dimensions.
C) Step number
D) Selection menu of "G" and "M" functions*
E) Axes selection menu
F) Axis value
G) Correction value (useful when a stored program needs to be reviewed)

STANDARD EDIT MODE

Here below follow a simple example of editing the first line of the program quoted at page 13.

First of all, insert plate dimensions (width, length and thickness) and the correspondent values of Tensile and Yield into the proper editing fields *(refer to letter B, fig. 35).*

a) Click into the first selection box on the first line and scroll the G functions list until you find G01 *(Fig. 36).* Click on it to confirm your choice.

Fig. 36

Fig. 37

b) Click on the selection box beside and choose PR axis, clicking onto it to confirm *(Fig. 37):*

c) Click into the third field and insert the desired value, pressing Enter key to confirm *(Fig. 38):*

ATTENTION! Remember always to press Enter key to confirm the inserted value.

Fig. 38

Fig. 39

d) Go on until you fill up your steps sequence. Remember to select END command (you can find it into the G functions list) as last step to finish your program. *(Fig. 39):*

Fig. 40

In order to make axis and functions selection easier, in Edit page there are available three auxiliary buttons *(Fig. 40)* that respectively activate the full menu of axes, G and M functions with the correspondent initials to select..

Some functions and axes activate further editing fields where to insert an auxiliary quote: for instance, the function@1 (it allows to skip to another step of the program and to repeat it many times as set,) or the axis FD (feeder), that activates another box in which to set the motion speed.

The full menus for axes and functions selection can be a very useful tool, especially when improving the *extended editing mode.*

EXTENDED EDITING MODE

By means of a specific selection into Settings page, it's possible to use an extended editing mode: instead of selecting axes and functions, searching for their initials scrolling the menus, the operator himself cam insert into the box the correspondent initial for the desired axis and function to program.

Of course it means the operator has already got such an enough good expertise about the system in use!

LEONARDO CAD

The **CNC Leonardo Folder** is equipped with a 2 kind of Cad systems: the first is a special solution optimized for the Custom COOPER POWER *(fig. 41)*; the second one is an advanced drawing system *(fig. 44)* that anyway can be successfully used even by a user unskilled in Cad applications.

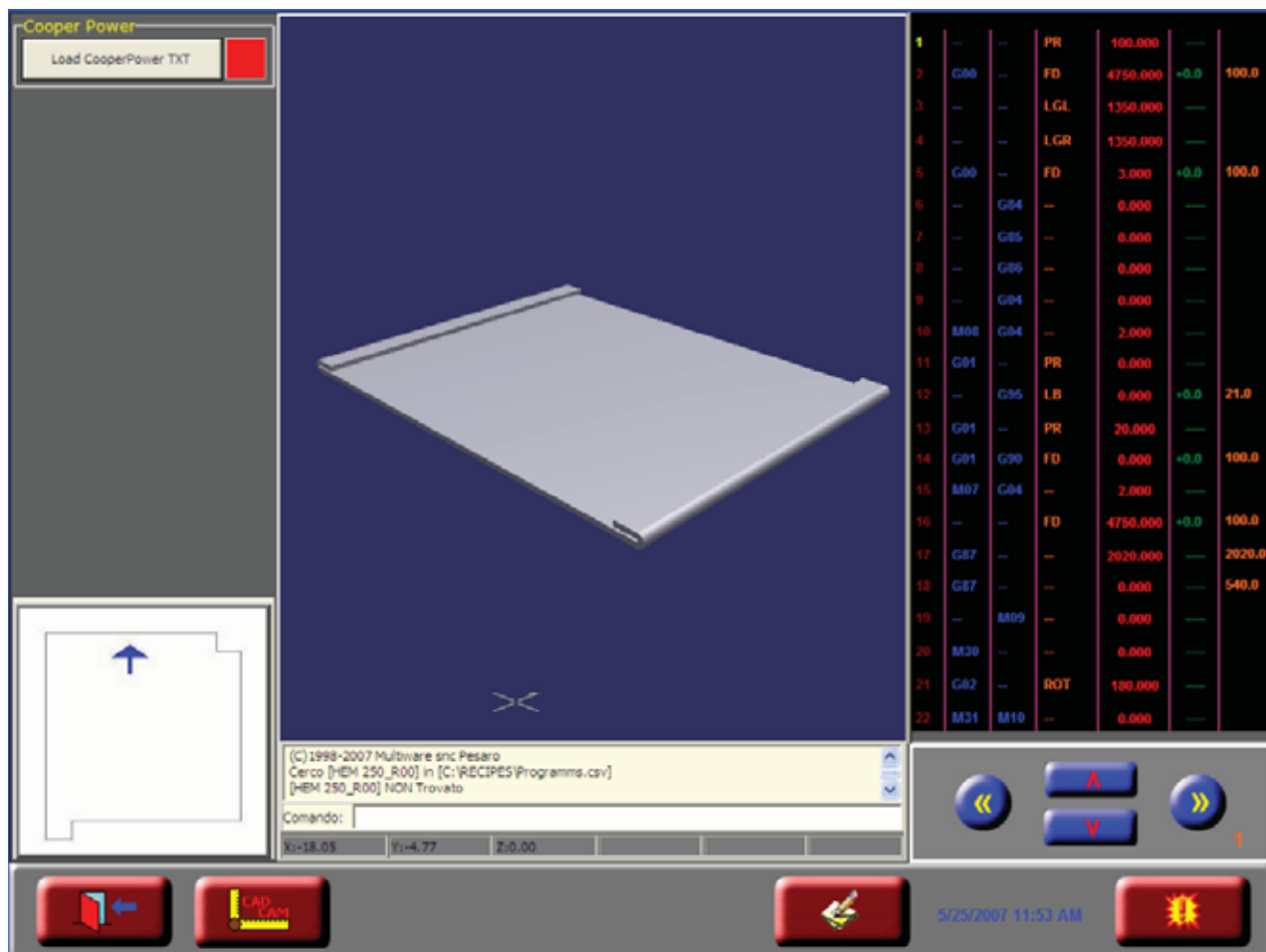## COOPER POWER CAD (Special Edition)

Fig. 41

Cooper Power Cad is a special solution developed by Promau R&D Department.

It behaves as a loading platform that allows to load data got by Cooper Power engineering department itself, simply pressing the button "Load Cooper Power TXT" *(fig.42)*.

Fig. 42

As mentioned above, through this button, the Cad system loads data from engineering department.

The system, at the import of the file, can recognize if the imported drawing has been already programmed at least once: in this case the grey slider on the right of button turns green and the system loads the right program stored in Leonardo database.

On the contrary if the system recognizes the imported data as a new drawing, the grey slider turns red and the Cad system will load a template sequence which belongs to the same "family".

Fig 43

The other functional buttons on the page allow to:

1   Esc the Cad page and go back to **Leonardo Edit** page

2   Enter the extended **Leonardo Cad** page *(refer to the following paragraph).*

3   Save the program just developed

4   Generate the program of the drawing just imported

EXTENDED LEONARDO CAD

The extended version of **Leonardo Cad** allows the customized shape drawing and the following program generating which are extremely quick and easy.
Leonardo Cad screen appears as shown here below (*fig. 44*).

Fig. 44

To begin drawing a customized shape and developing the correspondent program, just insert the plate dimensions *(Fig.45)*: width, height and thickness: according to this last value, the bending radius will be automatically provided by the CNC. In the main section of the screen will immediately appear the plane plate *(Fig. 46)*
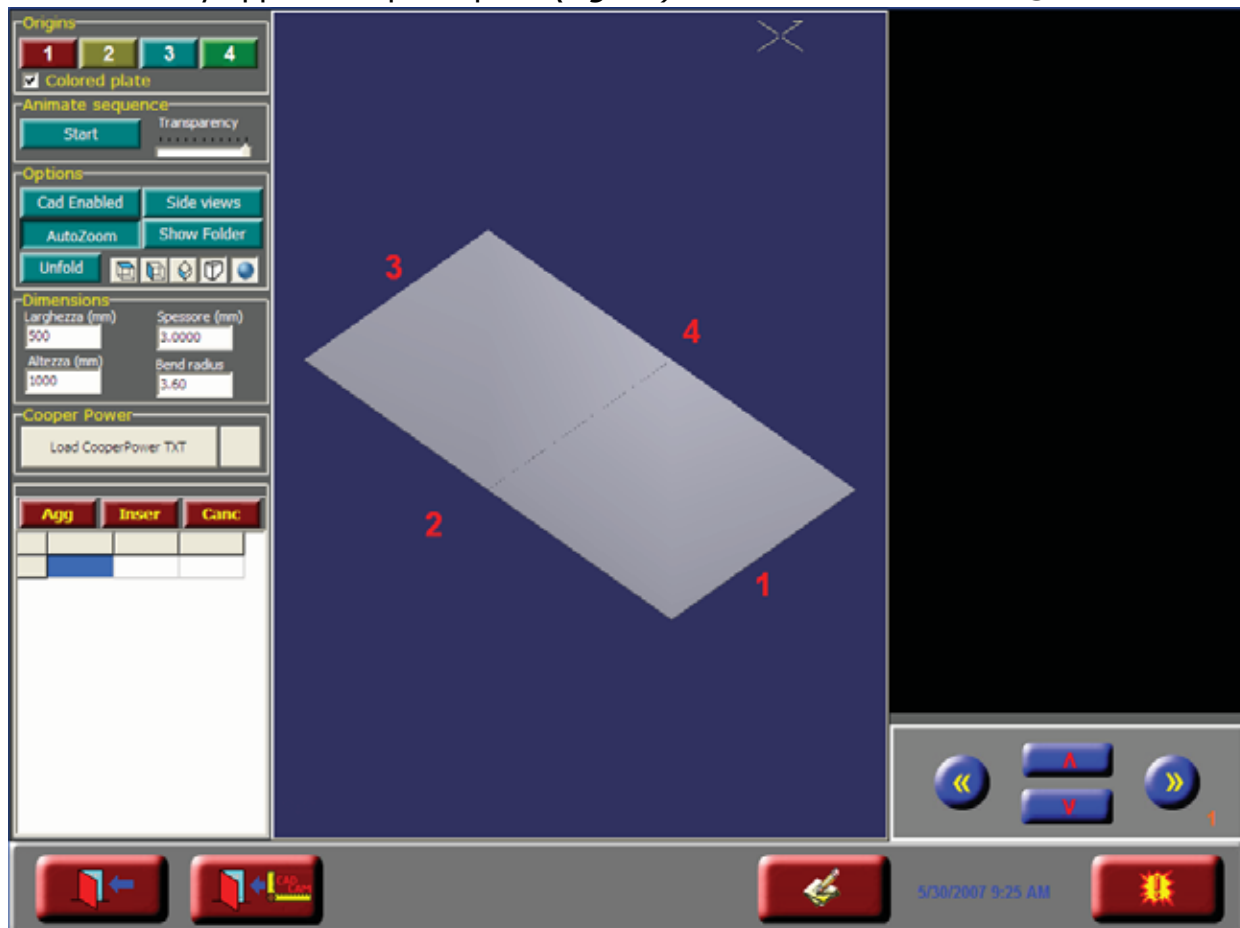

Fig. 45

Fig. 46

Select the "origins" that is to say the plate side you mean to fold.

There are 4 origins available: the first one is the plate side which closer to the bending beams; the others follow (*fig.46*).

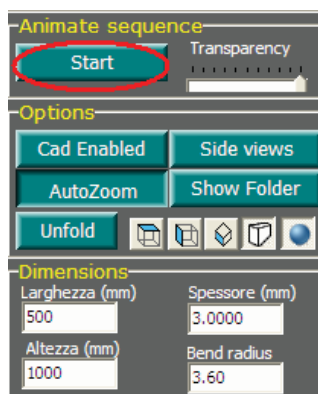In Cad pages there are some useful options *(fig 47)*:

Fig. 47

Cad Enabled	It activates the Cad toolbars (for more details refer to the attached "**Leonardo** manuals Cad").
Side views	It lets select three different views of the plate.
Auto-zoom	Automatically activated, this option gives to the operator a proportional visualization of the piece drawn.
Show folder	It shows the machine with plate charged. Pressing "Start" key (highlighted in red in *fig. 47*), it starts the animated sequence of the plate and bending beams motion. By means of the spider "Transparency" you can increase or decrease machine visibility around the plate.
Unfold	It displays the dimension values along plate sides.

By the selection of one of the origins, the keys "Agg" (add) "Inser" (insert) and "Canc" (delete) turn into the correspondent colours. For instance, in the figure *48*, the origin selected is the first one with the correspondent dimensions inserted.

Agg	Inser	Canc
1	80.00	-45.00	3.60
2	30.00	75.00	3.60
3	100.00	90.00	3.60

Fig. 48

Insert the first value: (the length of the first fold) and press Enter. Then insert the second one: (the angle degrees you want to fold) and press Enter again.

The third value (the folding radius) will be automatically inserted by the CNC. The display of the plate changes *(fig. 49)*.

To add a further line, just click on the key "Agg" *(fig.48)*.

To insert another line among two others already existing, make selection of the lowest of the two lines by means of the correspondent grey button (on the left besides each line) and press on the key "Inser" *(fig.48)*.

To delete a line, select it and press the key "Canc" *(fig.48)*.

Once finished the fold programming of the origin selected, go on with the other origins according to your need, repeating the sequence above.
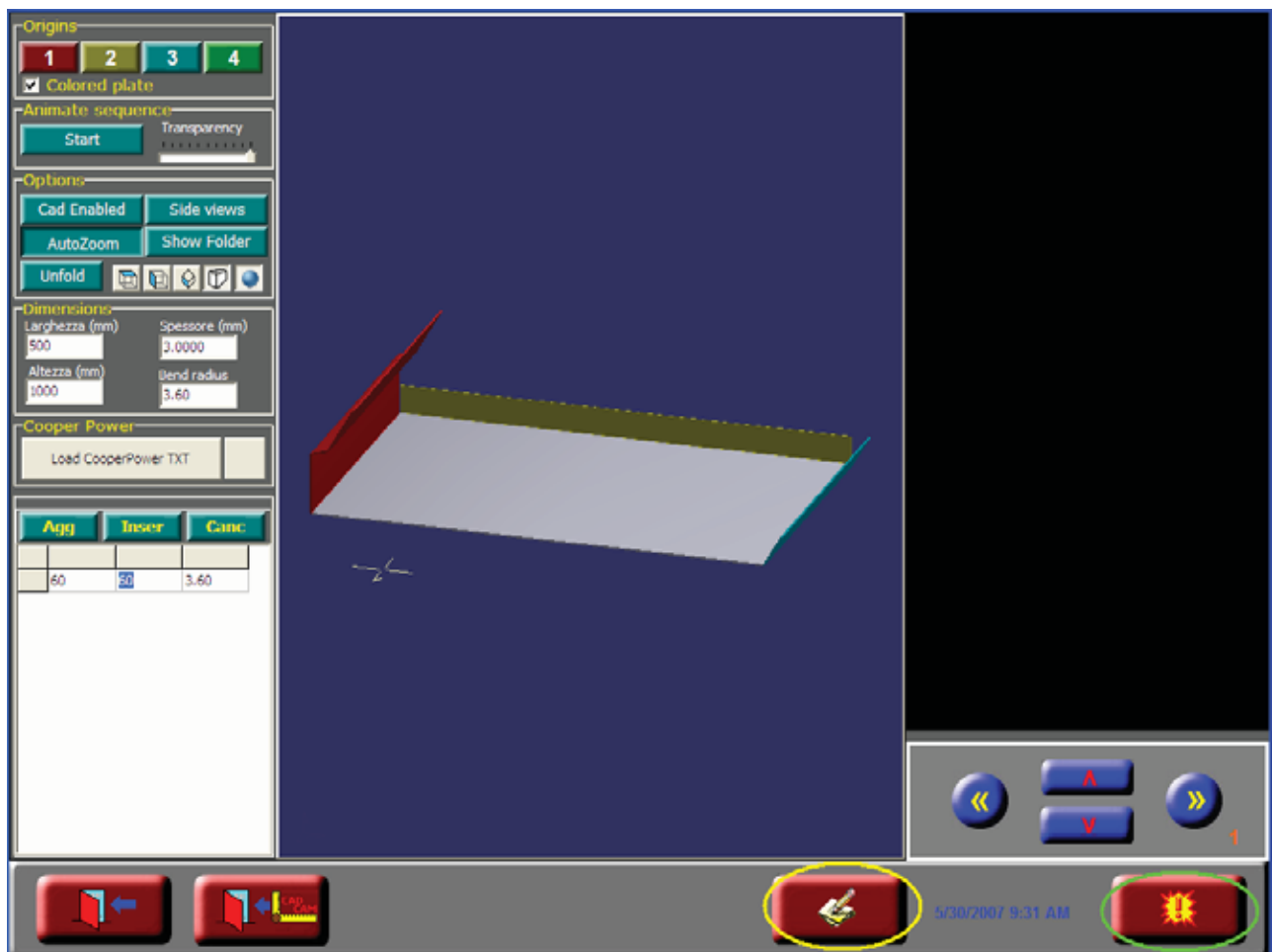

Fig. 49

To generate the program, press the button "!" on the right of the lower bar (green highlighted in *figure 49)*: it will appear into the column on the right: it is possible to skim through the steps by means of the blue arrows

Pressing the button [button image], store the program just created on **Leonardo Cad**. A blue window will appear just over the program *(see paragraph "Save a program" at page 14)*.

PROGRAM EXPORT

From **Leonardo Edit** page, pressing button , it is possible to export all the recipes stored. **Leonardo** system creates into the directory named "Recipes", located on the hard disc, a rescue file with format .csv. It can be then exported to a USB Memory stick.

PROGRAM IMPORT

From **Leonardo Edit** page, the icon activates a dialogue box *(Fig.50)* where you have to insert the name of the program you want to import. The system will search for this program in the file with format .csv, which is stored into the directory named "Recipes" in the hard disk (it means that, before making importation of a program, all the data you want to import must have been copied into this directory).

Fig.50

PRODUCTION PLAN

Clicking on the it's possible to edit a sequence of different program that the machine can execute in automatic working mode. *(Fig.51)*.

Clicking on the first selection box choose the program to run first, then click into the box besides and insert the amount of pieces to produce. Repeat until to compile the whole sequence of programs. Give a name to the production plan and save it by means of the "floppy" icon.

By means of the "archive" icon it's possible to call back an already stored production list I order to set any changes needed (replace or delete a program, modify number of pieces, etc.).

From main page, selecting on the left the first button, it change over the automatic working mode from Single mode to Multi mode in order to load to PLC the production plans into **Leonardo** database.
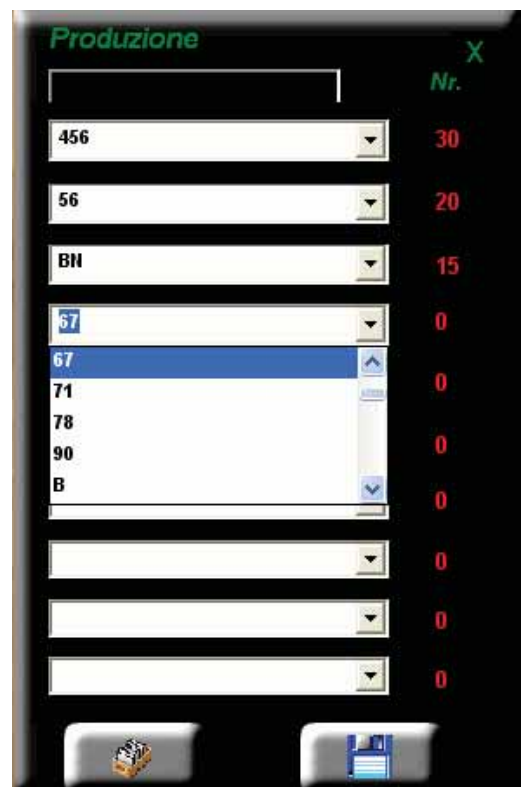

Fig.51

MACHINE SETTINGS PAGE

Fig. 52

Clicking the icon in main menu, it opens the **Machine Settings** page.

In order to protect the machine from unauthorised interventions, a password is asked to enter the most of the functions that are available from this page: axes parameters (1), general settings (2), and electrical parallelism parameters (3) can be set only by Promau engineers.

Icon nr°5 shows the amount of machine working hours.

Icon nr°6 opens Davi's Internet Site: from here, in case of problems with your machine, it's possible to exchange data about diagnostics with Promau engineers.

By icon nr°7 you can set the language of **Leonardo**: each time the icon is pressed, CNC language changes.

ALARM MESSAGES

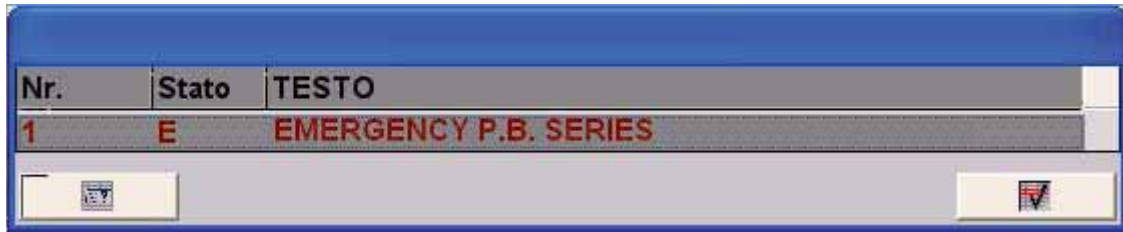| Nr.	Stato	TESTO
1	E	EMERGENCY P.B. SERIES

Fig 53

This kind of messages appears each time an emergency or an error occurs on the machine or in the working process and it is necessary the operator solves the problem.

To get some more info about the problem occurred and about its causes, click by mouse on the left button on the lower bar of the alarm window.

Once the causes are removed, restore the machine status pressing STOP key on console (in case the alarm is concerning the emergency system, as shown here above in figure 53, press RESET key) then click on the right icon of the alarm window in order to acknowledge the problem occurred: the alarm box will disappear and it will be possible to go on working with the machine.

Alarms list:

```
CTL/CTR DRIVE FAULT
ROTATION DRIVE FAULT
FEEDER DRIVE IN ERROR
LTR/LTL DRIVE IN FAULT
UTR/UTL DRIVE IN FAULT
UC/LC IN FAULT
SAFETY GUARD EMERGENCY
EMERGENCY P.B. SERIES
NEG OR POS EXTRASTROKE
CTL EXTRASTROKE
CTR EXTRASTROKE
BEND NOT POSSIBLE: UNLOADER TABLE NOT BACK
FEEDER-ROTATION COLLISION
OVERPRESSURE OR INSUFFICIENT PRESSURE: HYDRAULIC UNIT OFF
OIL FILTER
OIL LEVEL LOW
US IN COLLISION
WARNING! CENTERER COLLISION
CENTERERS NOT BACK
TOOL UNLOCKED
INTERFERENCE CTL/CTR
INTERFERENCE SIDE MOVEMENT GRIPPERS
LGR/LGL DRIVE IN FAULT
SGR/SGL DRIVE IN FAULT
UC/LC PROGRAM ERROR
LS COLLISION
UB COLLISION
FD PROGRAM ERROR
PR PROGRAM ERROR
US/LS PROGRAM ERROR
```

UB/LB PROGRAM ERROR
ROT PROGRAM ERROR
CT PROGRAM ERROR
GRIPPERS PROGRAM ERROR
MICROMETERS COLLISION
CAMERA READER ERROR!
IMPOSSIBLE TO MOVE THICKNESS
UNLOADER TABLE NOT BACK
UNLOADER TABLE NOT LOW
LOADER ALLARM
FEEDER COLLISION ALLARM
LB COLLISION
PR COLLISION
FD COLLISION
PIECE NOT GRABBED BY VACUUM
THERE IS NOT AIR
AXIS EXTRASTROKE
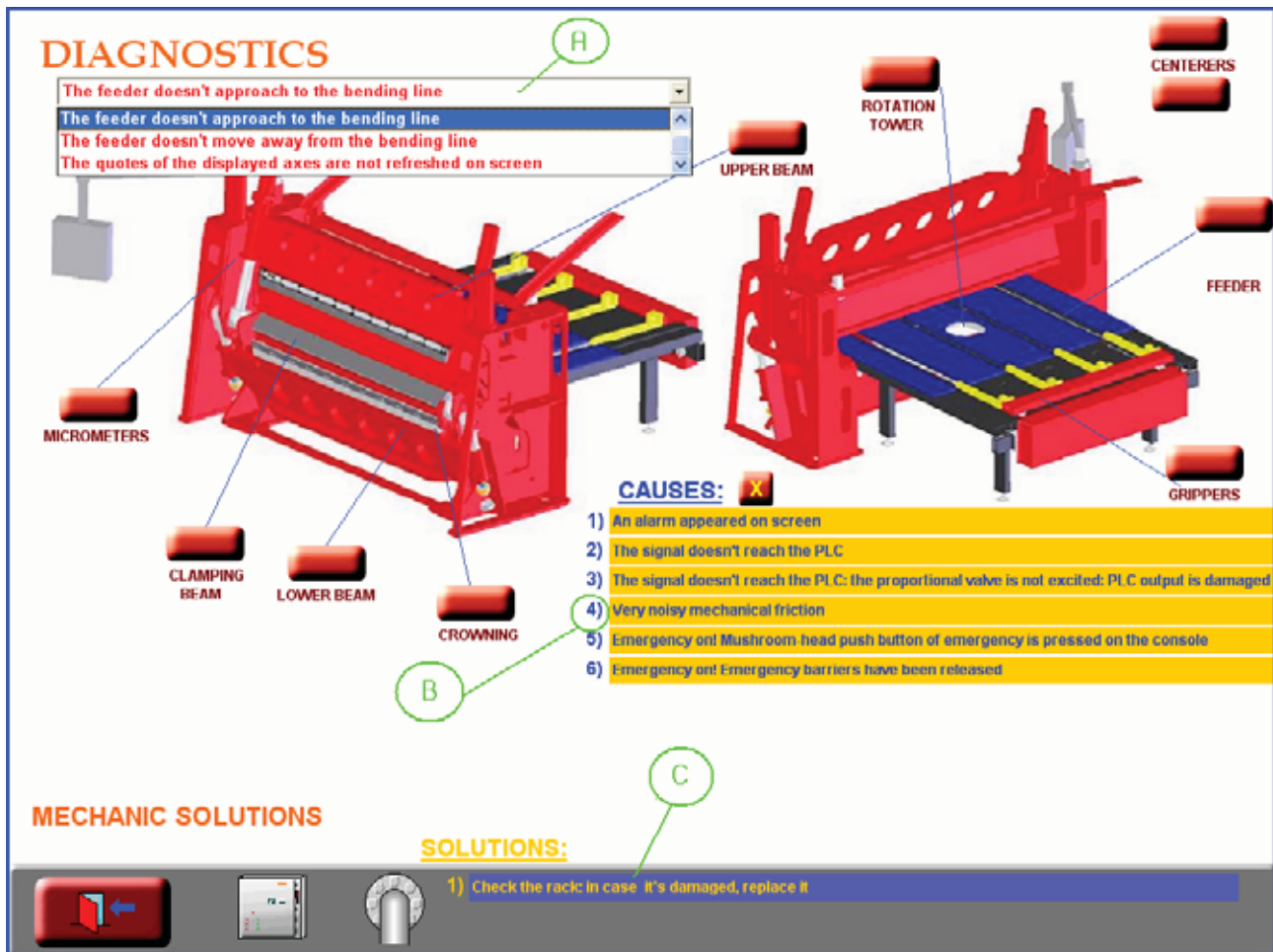
DIAGNOSTICS PAGE

Fig.54

Our machines have been submitted to accurate tests and to severe controls

For this reason we can assure to our Customers the longest life time and efficiency.

The greatest security is assured by the **CNC Leonardo Folder** itself, which constantly controls the "good health" of the connected machine, communicating to the operator any possible breakdowns by means of a new diagnostics system, which is really user friendly even if innovative on the market.

From the Main page, just press on the icon [icon] to enter into the Diagnostics Page (*Fig.54*) which shows the machine components.

Each red marker, when activated by a click, opens a selection menu of the possible problems that can occur to that specific component *(letter A – fig.54).*

Select the most representative description of the problem occurred to the machine: it opens another window which display the possible causes *(letter B – fig.54).*

Clicking on the number besides each cause, it activates the description of the suggested solution which can be a MECHANIC, ELECTRIC OR HYDRAULIC solution *(letter C – fig.54).*

Clicking on the icons [icon] [icon], located also on the lower bar, it is possible to enter respectively into the electric diagnostics page, and into the hydraulic diagnostics one. The electric diagnostics page displays all the modules installed on the machine *(fig.55),* and also the several sockets there are on the machine *(fig.56).*

Fig.55

Clicking on the button , it is possibile to look over the electrical board components.
The selection of the numbers over the modules activates the list of the correspondent digital I/O: (click again on the activating number to shut down).
This page is really useful to detect the status of each module or socket: if the identification number of a module starts blinking red (instead of being lit green), it means the device isn't run properly. If into the module picture appears a red spot, it means the I/O signal is not arriving (all the module spots should be green lit).
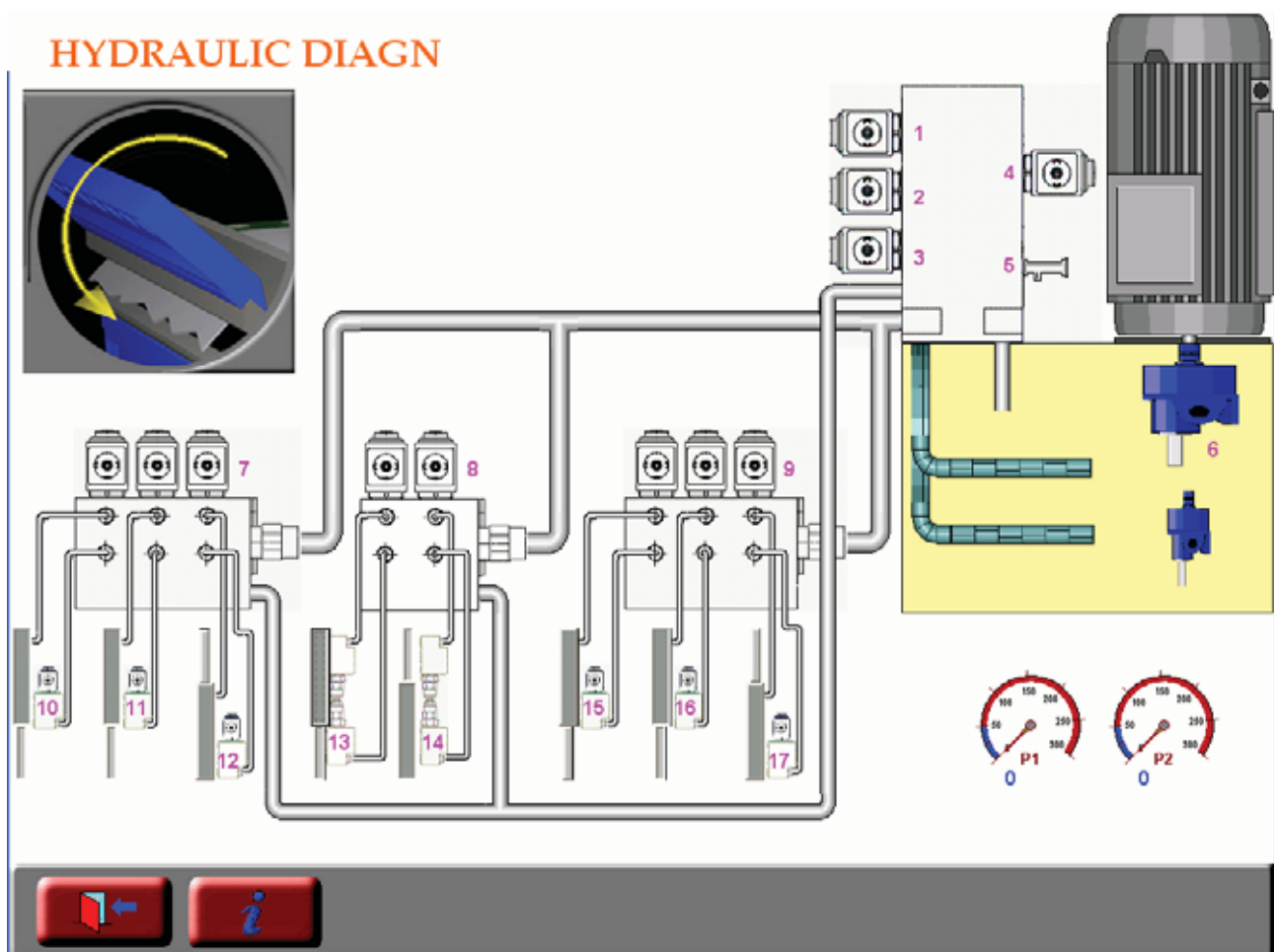

Fig.56

Fig.57

Through hydraulic diagnostics page is possible to follow the hydraulic oil flow that, by the activation of an axis, from the pump reaches the valve that controls the axis.

Whenever a breakdown occurred, the hydraulic drawing can give an idea of the interruption point, allowing a well timed intervention.

Clicking on the cylinder besides each valve it activates the correspondent axis display.

Pressing "*i*" button, it opens the informative box about the hydraulic components.

All the functions provided by the Diagnostics of Leonardo CNC may help you to find out any trouble on your machine and will make communication with Promau Customer Service easier.
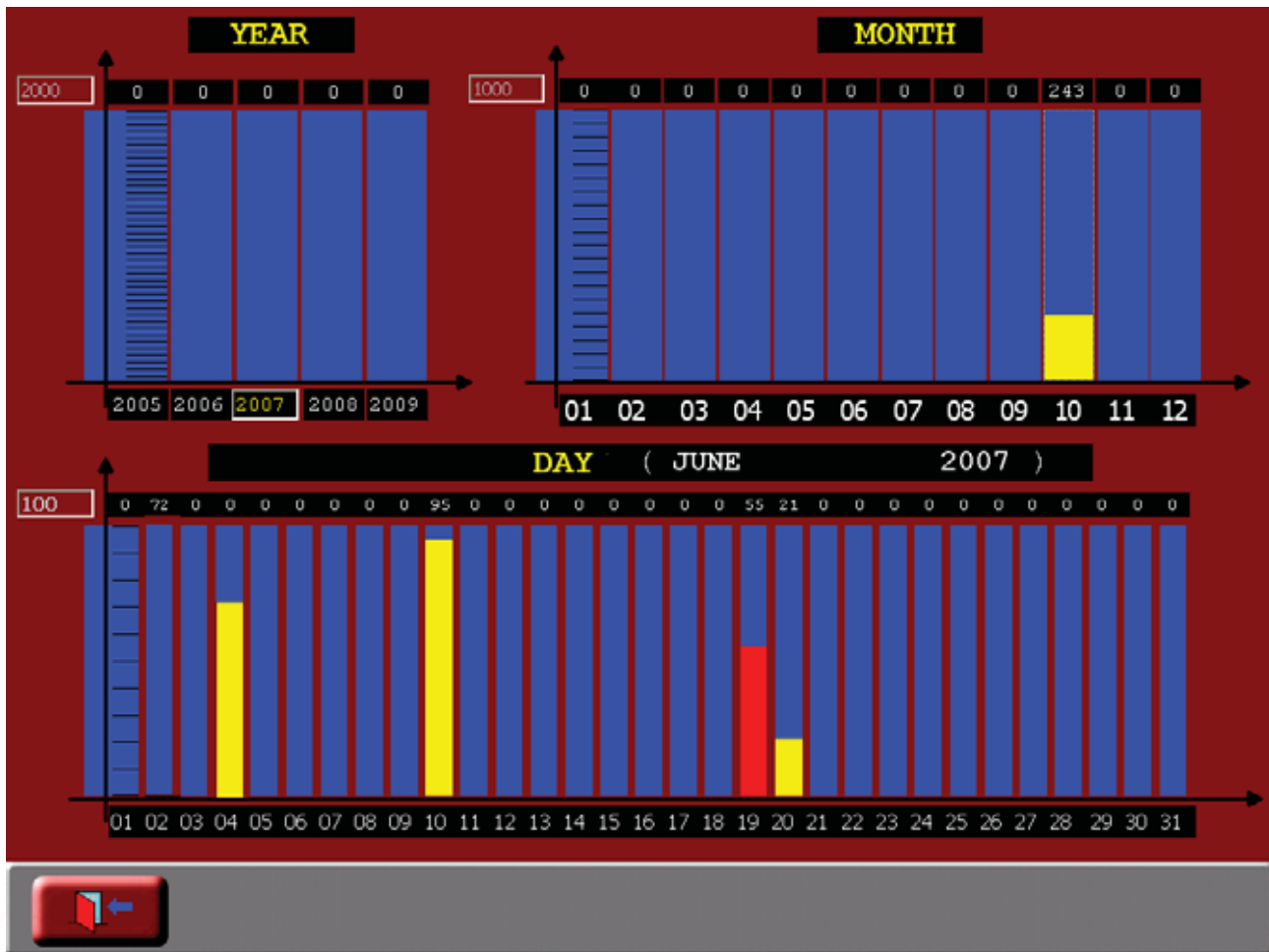
PRODUCTION REPORT

Fig.58

From main menu, clicking on the icon [icon], it opens the Production Report graphic bar *(Fig. 58)*.

Leonardo CNC can store data about the productivity of the connected machine and it can give a clear read-out about it, displaying data as "year", "month" and "day": that means it is possible to check exactly how many pieces have been produced on any date.

Data reading is give both graphically and in numerical terms (the value just above the bar graph).

Besides, YEAR, MONTH and DAY labels there are the correspondent reference scales that can be modified as you may prefer.