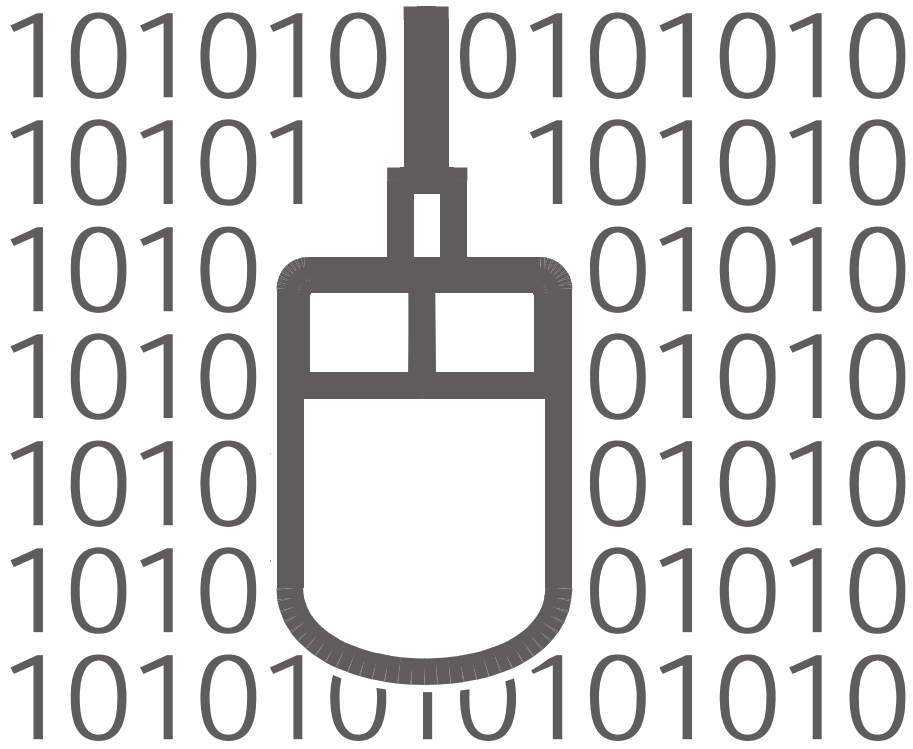
INTERMAC

Master

User's Interface Manual



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0	First issue		
1	General update		

This manual must be used by personnel adequately trained in the use of the software.

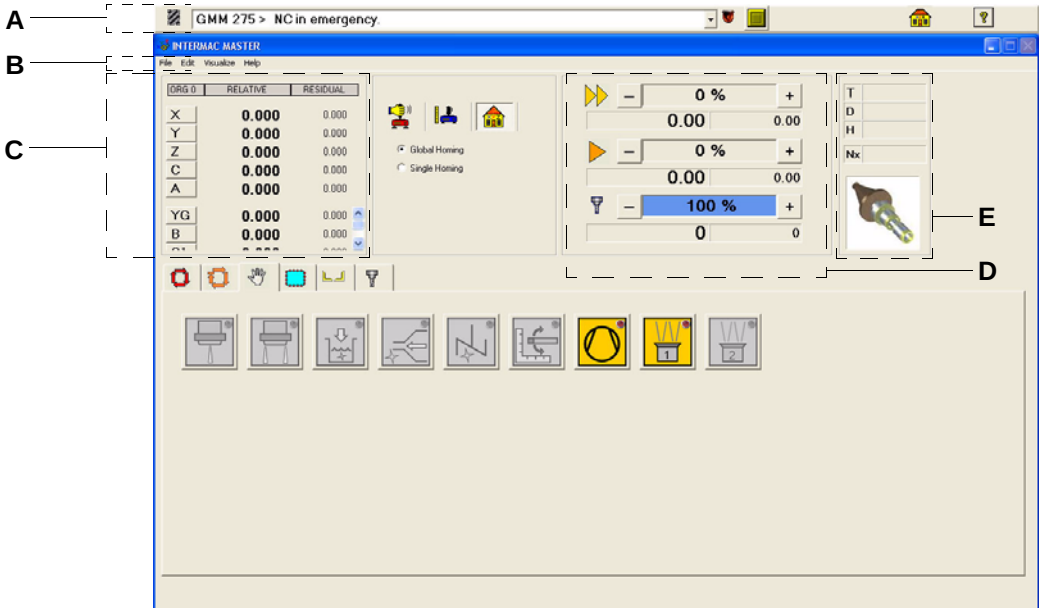
Index

1 Description of the first work page

At the start of the software program the first page to appear on the monitor displays the various work environments, as shown in the figure and as listed herebelow:

- AUTOMATIC environment ;
- SEMIAUTOMATIC environment ;
- MANUAL environment;
- DATA ACQUISITION environment;
- ORIGINS
- TOOLS.

The MANUAL environment is the default at the start of the program.



Some of the areas in the first page will remain unchanged when going from one environment to another: they will always be on view. These areas are located in the upper part of the page and are:

A “Status bar”;

B “Menus bar”;

C “Axes tracking area”;

D “Speeds area”;

E “Tools area”.

1.1 Status bar

The figure shows the status bar, to be seen at the top of the screen.

The status bar, which is constantly active and in view, contains the following information:

A Status of the machine

B Dropdown menu with currently active messages

C Indication of message changes

D Delete messages button

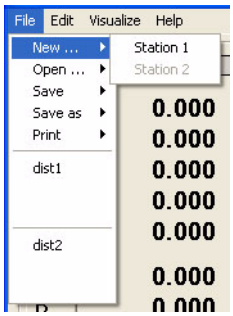
E Program version button

F Machine operating mode. Indicates the current operating mode of the machine: AUTOMATIC, HOMING, MDI LINE, MANUAL.

1.2 Menus bar

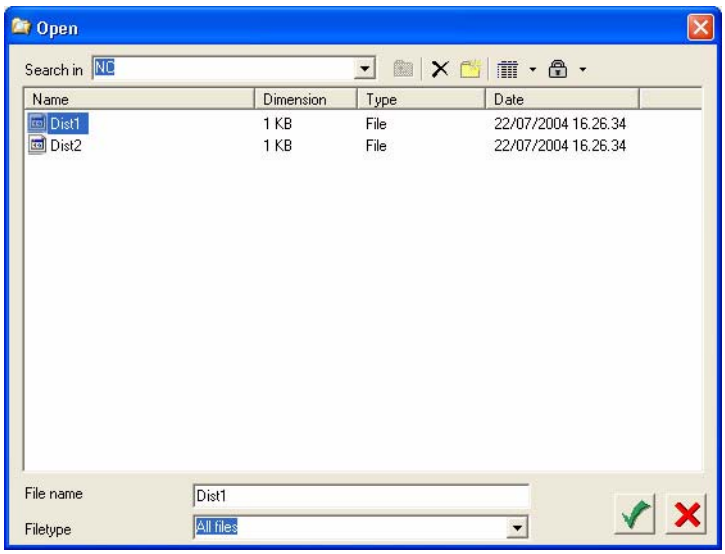
The menus bar is just under the status bar and it includes 4 items:

A File: new, open, save, save as, print.

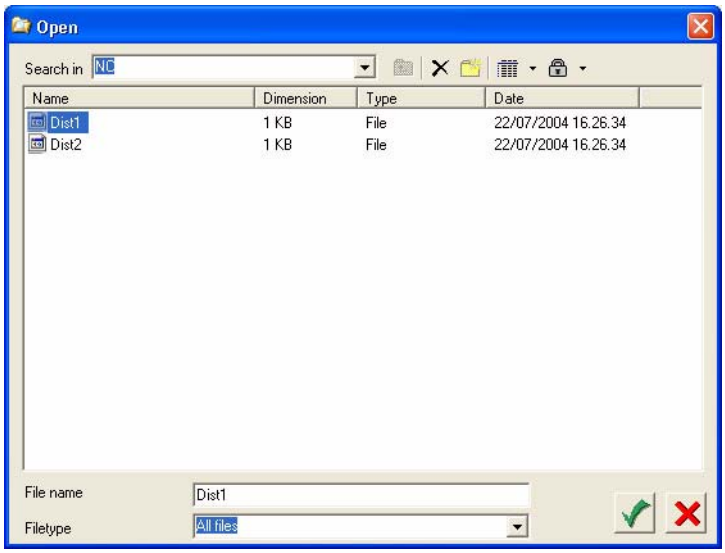


Each of these commands is equally accessible from machine control station 1 and from machine control station 2.

To create a new file list in station n, select “new ➤ station n”. A new window will appear where the new file name can be entered and subsequently saved by pressing the green button at bottom right. When in the automatic environment, of the table corresponding to station n will now contain empty lines available for the importation of operating programs.

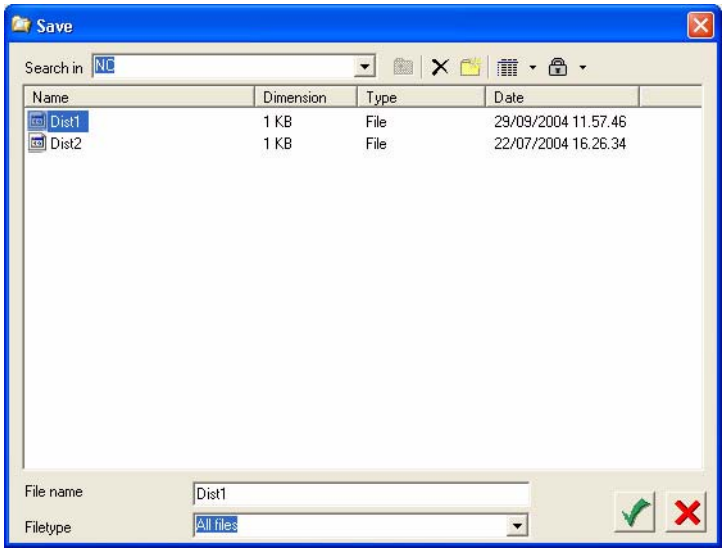


If “open ➤ station n” is selected, a previously saved file list may be opened. A new window will appear, as shown in the following figure, where the file name corresponding to the desired list may be specified. The list can then be loaded by clicking the mouse on the green button at bottom right, in which case all the operating programs present in the in the list just loaded will be inserted in the automatic environment of the table corresponding to station n.



The active file list may now be saved by selecting “save ➤ station n” .

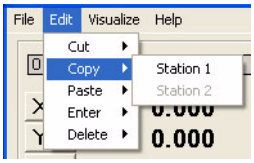
If “save as... ➤ station n” is selected, a new file list may be saved after its name has been entered in the ensuing window . The command is confirmed by clicking the usual green button at bottom right.



The “print” command is not active.

The following 5 commands may be used to view the list of operating program files that were last opened in station 1 and station 2.

B Edit: cut, copy, paste, enter, delete.



Each of these commands may be assigned to either station 1 or station 2.

If “cut ➤ station n” is selected, the operating program identified by symbol ➤ in the table corresponding to station 1, automatic environment, will be cut. The program just cut may be reinstated in the list with the “copy” command.

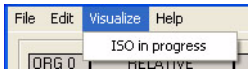
If “copy ➤ station n” is selected, the operating program identified by symbol ➤ may be copied in the table corresponding to station n, automatic environment .

If “paste ➤ station n” is selected, a previously copied operating program will be pasted in the line identified by symbol ➤ in the table corresponding to station n, automatic environment .

If “enter ➤ station n” is selected e new program line may be inserted on the line identified by symbol ➤ in the table corresponding to station n, automatic environment .

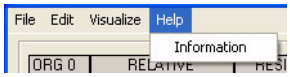
If “delete ➤ station n” is selected, the operating program on the line identified by symbol ➤ in the table corresponding to station n, automatic environment , will be deleted.

C Visualize: ISO in progress.



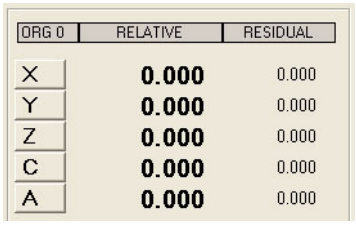
If “ISO in progress” is selected, the ISO code currently being run is displayed.

D Help: information



If “Information” is selected, the following window with software information is displayed.

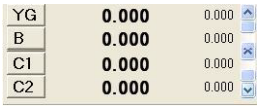
1.3 Axes tracking area



The axes tracking area is placed on the left of the work page to show the instantaneous coordinates of the operating head of the machine. Columns RELATIVE and RESIDUAL in this table give the position of the operating head referred to the active origin of the axes. The RELATIVE dimension gives the distance traveled by the tool from the origin, while the RESIDUAL dimension is the distance still to be covered in the same direction to reach the end of the run.

Axes X and Y are the axes on the horizontal plane. Z is the axis in the vertical plane. Axis C, if present, is the rotation about the Z axis. Axis A, if present, represents the condition of tilt about the Z axis.

A further number of secondary axes appears under the above mentioned five axes:



The YG axis: to all effect is equal to the Y axis, which is called YG when the movement along the Y axis is controlled by the slave motor, rather than by the normal Y axis motor (master).

The B axis is a “virtual” axis used during chamfer machining operations.

Axes C1 and C2 are utilized for tool changes in the two tool magazines, if present.

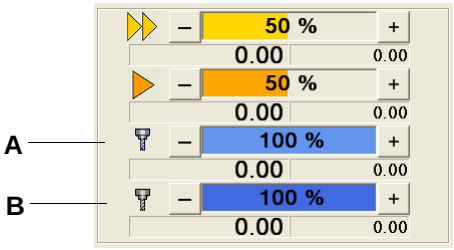
CT1 is the axis of the tool holder magazine mounted on the head, if present.

1.4 Speeds area

The speeds area is found on the right hand side of the work page and it contains three indicators:

- “Fast travel speed”;
- “Interpolation speed”;
- “Spindle rotational speed”.

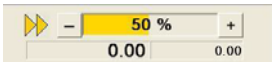
There are two indicators of the speed of rotation of the mandrel for the Master Twin machine.



A = Indicator of the primary mandrel

B = Indicator of the secondary mandrel

1.4.1 Fast travel speed



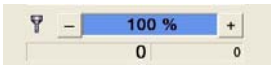
This indicator shows the speed at which the operating head is traveling without doing any machining on the workpiece. This speed may be modified by changing the percentage of the nominal speed value.

The nominal speed value is shown underneath, at the right, while the actual speed value is at the left. The value of the percentage may be changed by clicking the mouse on the + or – buttons. At 100%, the actual speed equals the nominal speed.

1.4.2 Interpolation speed

This indicator shows the speed of the operating head while machining the workpiece.
The programmed speed value is shown underneath, at the right. The actual speed, at the left.
The value of the percentage may be changed by clicking the mouse on the + or – buttons.

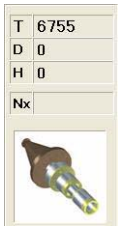
1.4.3 Spindle rotational speed



This indicator shows the rotational speed of the spindle.
The programmed speed value is shown underneath, at the right. The actual speed, at the left.
The value of the percentage may be changed by clicking the mouse on the + or – buttons.

1.5 Tools area

The tools area is found at the extreme right of the work page.



For the explanation three items in the tools area, see the following:

T: code number of the tool currently on the spindle of the operating head.

D: Diameter of the tool currently on the spindle.

H: height of the tool currently on the spindle.

Nx: code number of the to be loaded next on the spindle as per operating program in the current list.

A representative picture of the tool currently on the spindle is shown under these first four items.

In the Master Twin machine the tools area visualizes the tool mounted on the primary and secondary mandrel.

1.6 Software environments

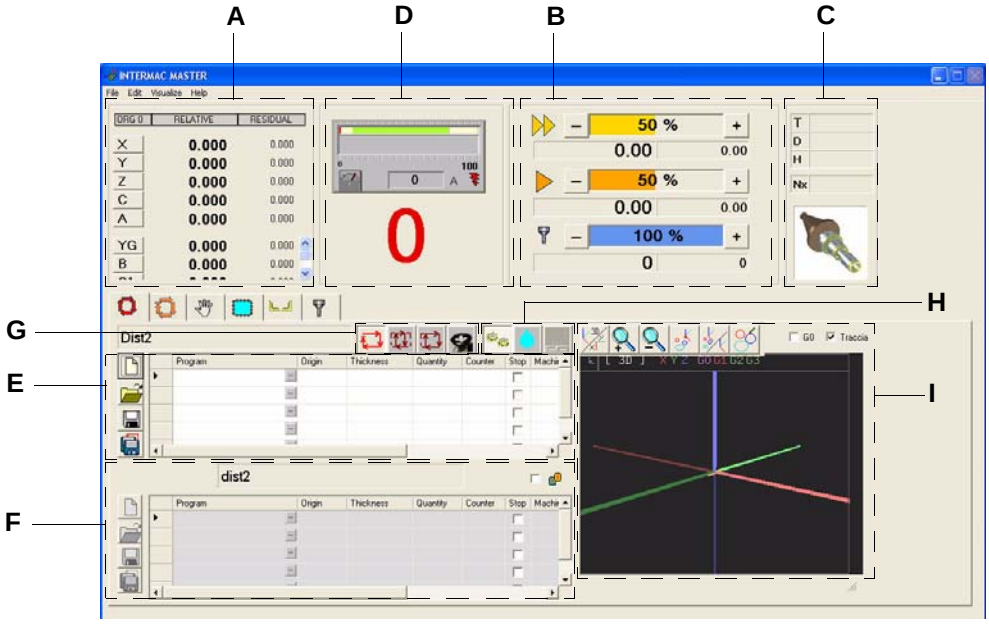
The various subdivisions of the software working environments are to be found in the lower part of the work page. As already mentioned, the environments are the following: AUTOMATIC, SEMIAUTOMATIC, MANUAL, DATA ACQUISITION, ORIGINS and TOOLS.

2 Automatic environment

The automatic environment is entered by clicking the mouse on the icon illustrated below:

In order to proceed with the machining operations contained in the programs in the automatic environment, program files may be loaded to station 1 (single station operations) or to stations 1 and 2.

The programs contained in the files are run by pressing button “start” on station 1 or 2 of the machine, depending on the station mode we are working in: single station mode (station 1), or double station mode (press button of station 1 first, then that of station 2, or vice versa).



The automatic environment includes the following areas and tables:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D “Ammeter area”;

E “Table station 1”;

F “Station 2 table”;

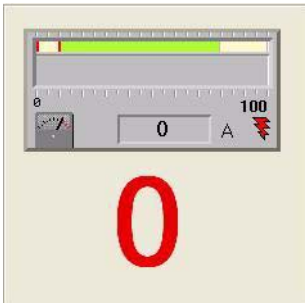
G “Machining operations type area”;

H “Machining modes area”;

I “Graphic simulation area”.

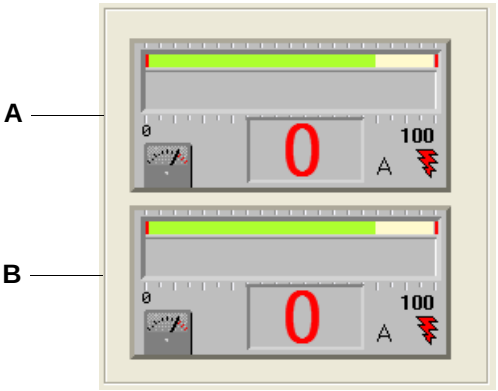
The first three areas are common to all environments and their descriptions are to be found in chapter 1 , paragraphs “Axes tracking area”, “Speeds area” and “Tools area”.

2.1 Ammeter area



The ammeter area contains an indicator showing the a value proportional to the current taken by the spindle.

There are two indicators for the Master Twin, each referring to one of the mandrels present on this machine.

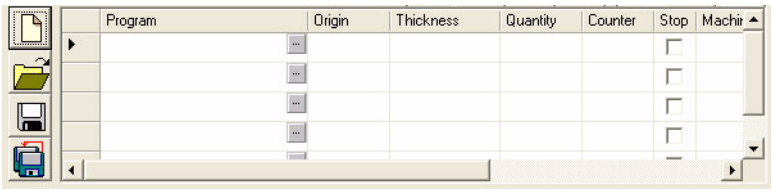


A = Indicator of the first mandrel

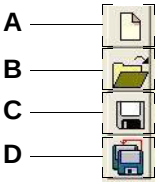
B = Indicator of the secondary mandrel

2.2 Table station 1

The file list for the machining operations to be run in machine station 1 is loaded in the station 1 table.



On the left of the table can be seen four buttons corresponding to some of the commands have already described in chapter 1, paragraph “Menus bar”.



Reading top to bottom, these commands are:

A new;

B open;

C save;

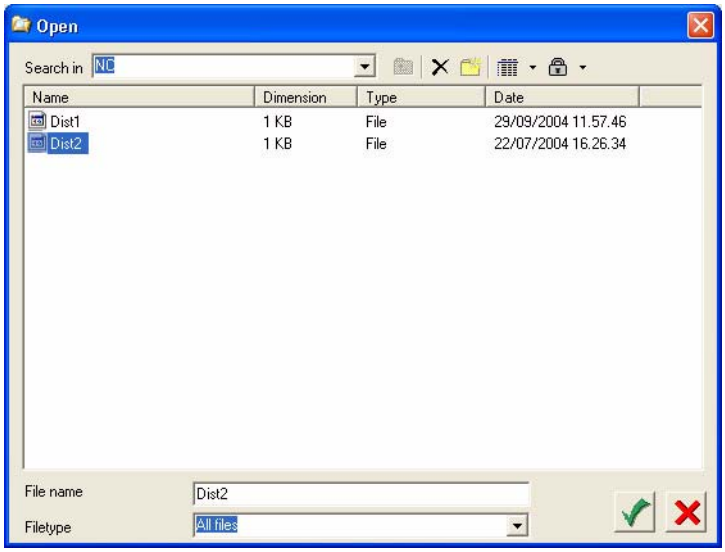
D save as.

See the above mentioned paragraph for further information.

The various machining programs contained in the active list appear on the lines of the table.

The programs will be run in sequence, beginning with the first selected line, but not before the “start” button is pressed in correspondence with station 1 on the machine. To add a machining program to the active list, it is sufficient to click the mouse on the symbol  of the first column (“Programs”).

This will open a window where the name of the machining program to be added to the list can be selected, to be subsequently confirmed by clicking on the green button at bottom right.

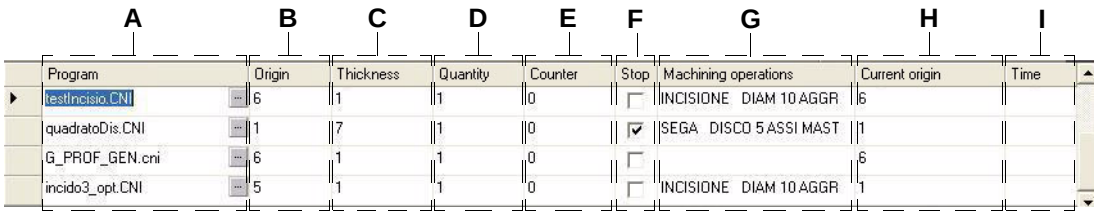


The program will be added in the line where the symbol ... was pressed. If a program already exists for that line, this will be replaced by the newly selected one.

For the other commands available here, such as cut, copy, paste, enter, ample explanations are given under chapter 1, paragraph "Menus bar" under the description for the "Edit" command.

See the above mentioned paragraph for further information.

The table contains several columns corresponding to the parameters connected with the machining programs contained in each line. These columns are:



A **Program:** Gives the name of the program on each line.

B **Origin:** Gives the name of the origin relative to which the workpiece is to be machined. Several origins may be entered, always separated by a comma. For example, when entering origins 1,5,7 the three workpieces will be machined according to the same program.

C **Thickness:** indicates the thickness of the workpiece do be machined.

D **Quantity:** indicates the number of times the program on the line is to be repeated. If the program has several origins and n is the number in the "Quantity" column, the program will run n times and the number of pieces produced will be equal to n multiplied by the number of origins.

E **Counter:** indicates the number of times the program in the line has already run. At the end of each run the counter will increase by 1 unit until it reaches the number shown in the "Quantity" column.

F **Stop:** indicates if there is the possibility of interrupting the programs in the list. The presence of the tick-off in the “Stop” column interrupts the sequence in which the machining programs are being run in correspondence with the end of the program of that line. The programs sequence will be terminated when all the workpieces foreseen by the program will have been machined. To proceed with the other programs present on the list it will be necessary to press button “Start” once more on machine station 1.

G **Machining operations:** indicates the machining operations foreseen by the program present on the line. Clicking the mouse in the “Machining operations” column on any one program line, brings into view the list of machining operations foreseen by that program.

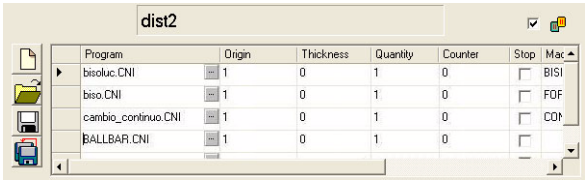
H **Current origin:** indicates the origin of the current machining program.

I **Time:** indicates the total running time of the program in the line.

The name of the lists loaded to station 1 is shown immediately above the station 1 table (see figure below):

2.3 Station 2 table

The file list of the machining operations to be run in machine station 2 is loaded to the station 2 table.



All the considerations that have been made for station 1 table of are valid also for station 2 table, being this a second station present on the same machine. The system makes it possible to work single station, and in this case it will be station 1 table, or alternatively double station, consequently with two tables. The choice is dependent on the presence or on the absence of the tick in the figure below:

When the tick is applied with a click of the mouse, the double station mode is activated. When the tick is not present, the single station mode is active and the tables of station 2 will be obscured. Station 1 will then be the only active station.

When working double station, the operator will choose which programs list to work with by pressing the “Start” button of station 1 or of station 2.

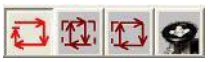
It is possible to book the sequential execution of the two lists: if while you are working on one station, press the start key of the other. At the end of the list on the station in use the machine will pass automatically to carrying out the list on the other station.

2.4 Machining operations type area

This area is found immediately above the station 1 table and contains 4 buttons corresponding to 4 different types of machining operations. The type of machining operations to be carried out may be chosen among those present. The choice must be made before pressing the “Start” button in correspondence with station 1 or station 2.

The types of machining operations are:

- “Complete machining program”;
- “Single machining operation”;
- “Partial machining program”;
- “Tooling up”.



2.4.1 Complete machining program

This machining mode makes it possible to utilize the whole tools sequence foreseen by the machining program.

This means that for each machining program in the active list all the operations present in the “machining operations” column will be executed in the programmed sequence, just as they appear in the column.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.4.2 Single machining operation

This machining mode makes it possible to utilize a single tool among those foreseen by the machining program.

This means that out of all the machining programs in the active list, only the one selected (and therefore visible) in the “machining operations” column will be executed.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.4.3 Partial machining program

This machining mode makes it possible to utilize only part of the tool sequence as foreseen by the machining program.

This means that, once a certain machining program has been selected in the “machining operations” column, all machining operations as foreseen by the machining program will be executed, starting from the selected one.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.4.4 Tooling up

This mode makes it possible to position stops and suction cups as the program demands.

This mode is to be used to position the necessary stops and suction cups in correspondence with the defined origin.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.5 Machining modes area

This area is to be found immediately above the station 1 table and it includes 3 buttons corresponding to three different machining modes. The desired machining mode may be chosen from this area by pressing the “start” button in correspondence with station 1 or station 2.

- “Normal machining operation”;
- “Dry run”;
- “Simulation”.

2.5.1 Normal machining operation

This is the machining mode normally used to run he programs. When in the normal mode the spindle is set running and the coolant is turned on.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.5.2 Dry run

This is the mode which allows the operator to simulate a program run.

When in this mode the machine will go through a machining program WITHOUT setting the spindle in motion and WITHOUT turning on the coolants. It is better to run in this mode without workpieces on the table.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

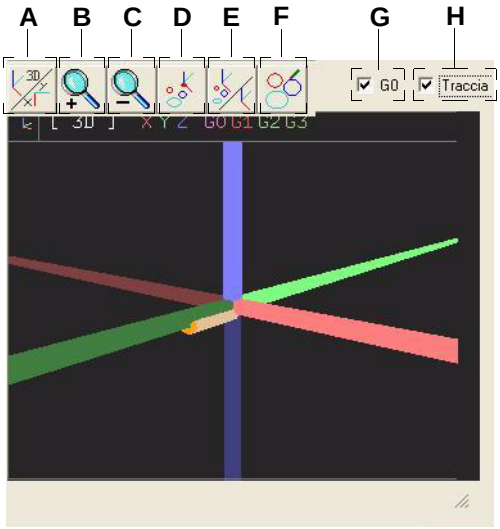
2.5.3 Simulation

When in this mode, the machining program are simulated only graphically. In this case not only spindle and coolants remain inactive, but not even the operating head moves. The graphic simulation can be observed in the “graphic simulation area” at bottom right.

To activate this type of machining the mouse must be clicked on the button represented by the figure below:

2.6 Graphic simulation area

In the area located at bottom right of the automatic environment can be seen the graphic simulation of the machining operations contained in the current program.



Reading left to right, the commands appearing immediately above the area are:

A **3D view/ Projections:** with this command it is possible to go from a 3D view to projections on the XY plane, on the XZ plane and on the YZ plane. In practice, the button must be pressed repeatedly until the desired view is obtained. The change from one view to the next is immediately visible in the preview area underneath.

B **Zoom in:** this command is used to enlarge the image.

C **Zoom out:** this command is used to make the image smaller.

D **Optimize image:** this command is used to dimension the image so that it will be visible in full.

E **Delete image:** this command is used to delete the graphic simulation of past machining operations.

F **Centre on tool:** this command makes it possible to centre the image on the position of the tool.

There are two further options which can be activated by adding a “tick” with the mouse.

G **G0:** when ticking this item the rapid displacements of the operating head will also be displayed.

H **Trace:** by ticking this item the graphic simulation is enabled. Deleting the “tick” leaves the graphic simulation not enabled.

2.7 Use of the laser projector from the list

The device commanded by the operator of the machine selectively projects the images of the abutting ends, suction cups and profiles associated with the selected machining program, on one original at a time.

To perform the projection from the automatic environment:

1. Select the line of the list that contains the program that you intend projecting.
2. Selecting what you intend to project in this way, you perform the selection from the list column ” Profiles to Project”.
3. Select the original to project selecting the number of the wanted original in the list column “Original to Project”.
4. Press one of the keys (projection keys), each excludes the other, on the check line of the double station drive, to the right of the above mentioned check. The keys mean “ set-up with projector”, respectively on list 1 and 2,.

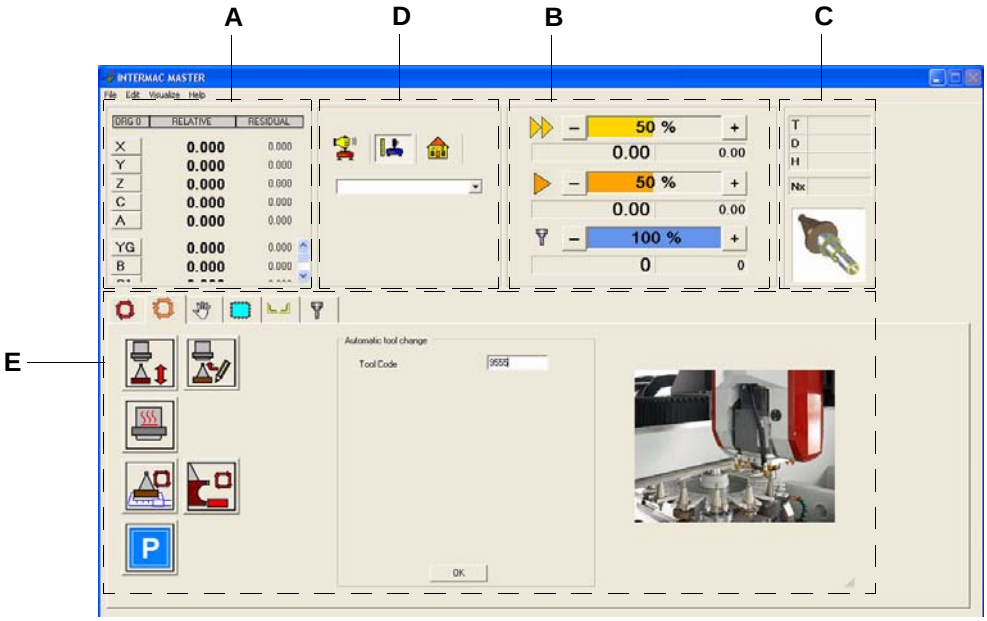
A this point the laser projects the selected information, keeping account of the original selected in the “Original Projection” column.

At the end of the set-up, press the set-up key with the projector to turn the projector off.

3 Semiautomatic environment

Enter the semiautomatic environment by clicking the mouse on the icon illustrated below.

While in the semiautomatic environment it is possible move along the axes in manual and to execute e series of operations in a semiautomatic mode. Some of these operations require the manual participation of the operator, other are executed automatically by the machine after pressing the “start” pushbutton on the controls panel.



The semiautomatic environment includes the following areas:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D “Machine modes area”;

E “Commands area”.

The first three areas are common to all environments and their descriptions are to be found in chapter 1.

3.1 Machine modes area

The machine modes area is in the upper part of the semiautomatic environment page, the same area occupied by the ammeter in the automatic environment.

The machine modes area remains in view in this position also in the case of the manual and of the data acquisition environments. This makes it possible to move the axes manually also in those environments.

Various commands are present in this area, depending on which of following two items is chosen "MANUAL", "MDI LINE (Machine Data Input line)" or "HOMING".

3.1.1 MANUAL

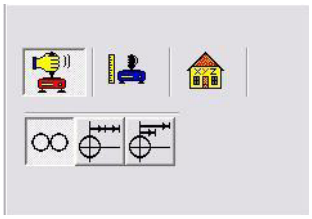
Enter the MANUAL mode by clicking the mouse on the icon illustrated below:

When activating the manual mode button the following alternatives become available:

- mode "Continuous manual displacements"
- mode "Incremental manual displacements (Jog)"
- mode "Absolute manual displacements"

Continuous manual displacements

When in this mode, continuous manual displacements are selected which take place at an appropriate speed.
The axes will move in a positive or negative direction depending on which pushbutton is used on the controls panel. If the **+** pushbutton is pressed, movement will take place in the positive direction; if the – pushbutton is pressed, the movement will be in the negative direction. The displacement along the axis will continue uninterrupted for as long as the pushbutton is kept down. The selected axis will be highlighted in the dimensions area. An axis is selected by clicking it with the mouse. The currently displayed dimensions are relative to the machine origin.

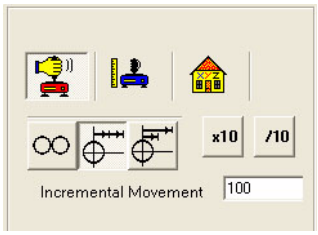


Incremental manual displacements (Jog)

With this mode, manual step by step displacements are selected which take place at an appropriate speed.

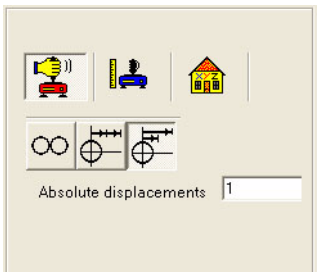
The axes will move in a positive or negative direction from, depending on which pushbutton is used on the controls panel. if the **+** pushbutton is pressed, the axis will move by one predetermined step from the current position, in the positive direction; if the – pushbutton is pressed, the axis will move by one predetermined step from the current position, in the negative direction. The selected axis will be highlighted in the dimensions area. An axis is selected by clicking it with the mouse. The currently displayed dimensions are relative to the machine origin.

The value of the increment (step) can be set by the operator by entering it in the appropriate data insertion field.



Absolute manual displacements

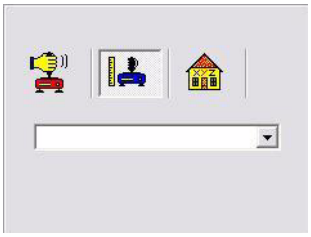
Absolute displacements are selected with this mode.
When the START pushbutton is pressed on the controls panel, the selected axis will move to the position set in the data insertion field. The selected axis will be highlighted in the dimensions area. An axis is selected by clicking it with the mouse. The currently displayed dimensions are relative to the machine origin.



3.1.2 MDI LINE (Machine Data Input line)

Enter the MDI LINE mode by clicking the mouse on the icon illustrated below:

When in this mode, the ISO code to be executed is entered in the data insertion field. The command will be activated by pressing the START pushbutton of the controls panel.

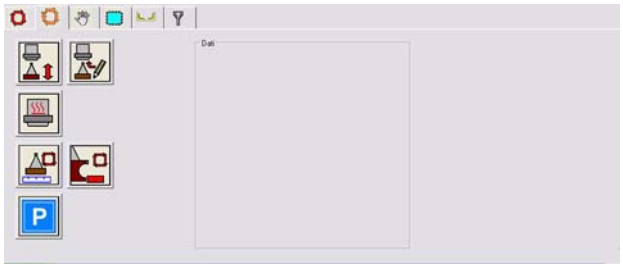


3.1.3 HOMING

When in this mode the axes are sent to their zero (home) position. Global homing will send all the axes to their zero positions. Single homing will sent to its zero position only the axis selected in the dimensions area. The selected axes will go to their home positions as soon as the “start” pushbutton of the controls panel is pressed.

3.2 Commands area

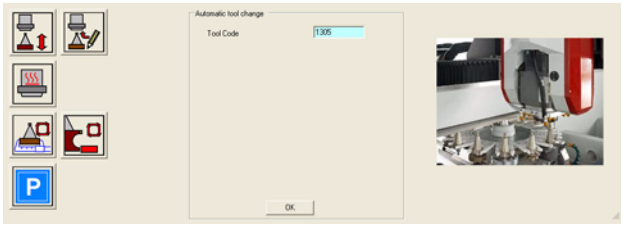
The commands area is to be found in the lower part of the work page. On the left side there are the buttons representing the various commands, while the area to their right will change according to the command which has been selected.



3.2.1 Automatic tool change

This command will be activated by clicking the mouse on the icon illustrated below:

The area to the right of the command buttons will now look as illustrated in the following figure.



With this command the currently mounted tool will be automatically exchanged with another tool from the tool magazine. For the tool change to take place the code corresponding to the tool next required must be entered in the appropriate data insertion field before clicking the OK button. The tool code may be obtained by consulting the tools table. The actual tool change will take place after the “start” pushbutton of the controls panel has been pressed. Leaving the code insertion field blank will cause the current tool to be unloaded without replacement.

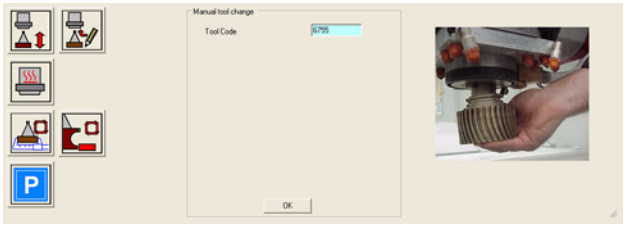
On the right there will be a picture representing the tool change operation carried out by the operating head.

In the case of the Master Twin machine it is possible to set the load and/or the unload on each of the two machines, writing the suitable tool code on the two entry fields seen. Only tools with the same height can be mounted contemporaneously on this machine.

3.2.2 Manual tool change

This command will be activated by clicking the mouse on the icon illustrated below:

The area to the right of the command buttons will now look as illustrated in the figure below.



This command is used to load a new tool code and relative modifications by association to the code of the currently mounted tool. The code corresponding to the currently mounted tool, which must in any case appear in the tools table, must be entered in the blank field, and the OK button must be clicked. The command is activated only after the “start” pushbutton of the controls panel has been pressed.

On the right there will be a picture representing the manual tool change carried out by the operator.

In the case of the Master Twin machine there are two tool codes. One for the primary mandrel and one for the secondary mandrel. Only tools that have the same height can be mounted contemporaneously on this machine.

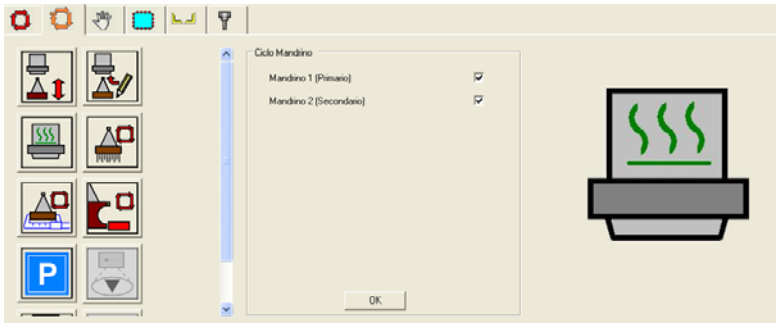
3.2.3 Spindle cycle

This command will be activated by clicking the mouse on the icon illustrated below:

The area to the right of the command buttons will now look as illustrated in the following figure.

This command will activate the spindle warming-up cycle. This will be achieved by first clicking the mouse on the OK button and the pressing the “start” pushbutton of the controls panel.

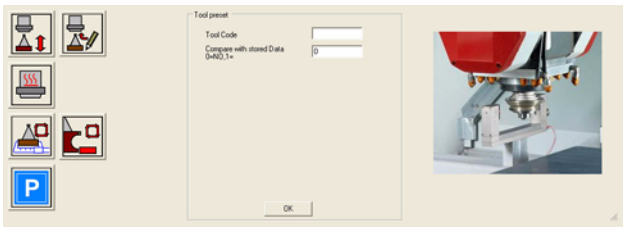
In the case of the Master Twin machine you can choose whether to carry out the heating cycle for the primary mandrel, for the secondary or both putting the pointer on the selection box..



3.2.4 Tool preset

This command will be activated by clicking the mouse on the icon illustrated below:

The area to the right of the command buttons will now look as illustrated in the following figure.



This command is for the automatic measurement of the diameter and height of a specified tool. The tool is specified by first entering its code in the blank data insertion field. Then by specifying if the measurements to be taken in the automatic mode are to be compared with the tool dimensions as they appear in the tools table. Entering “0” in the “Compare with stored data” field will prevent comparisons from taking place. If, on the other hand, “1” is entered, the comparison will take place. The automatic measurements will be ignored if their difference from the reference data should be too great.

In practice, first the correct entries will be made in the “Tool code” and “Compare with stored data” fields, then the command will be activated by clicking the OK button before pressing the “start” pushbutton of the controls panel.

3.2.5 Dressing the polishing wheels

This command will be activated by clicking the mouse on the icon illustrated below:

The area to the right of the command buttons will now look as illustrated in the following figure.

This command controls the dressing operations on polishing wheels.

In practice, the code of the tool to be dressed is entered in the “Tool code” field and the thickness of material to be removed from the tool is entered in the “Grinding thickness field”. The command will then be activated by clicking the OK button before pressing the “start” pushbutton of the controls panel.

3.2.6 Parking the axes

This command will be activated by clicking the mouse on the icon illustrated below:

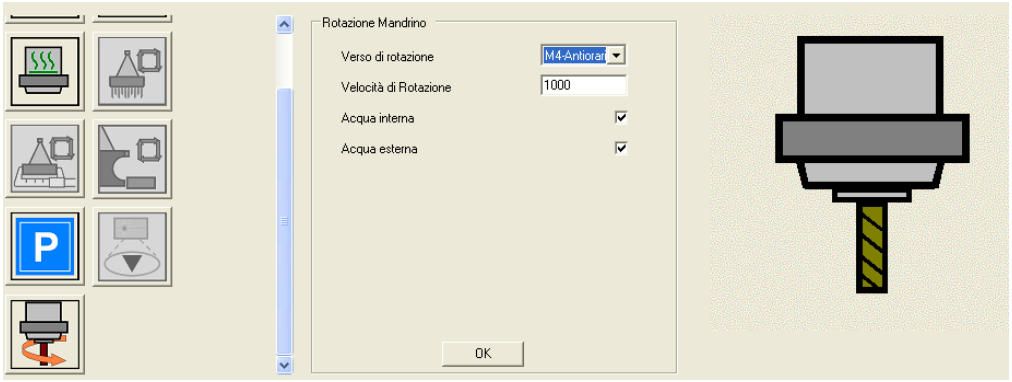
The area to the right of the command buttons will now look as illustrated in the following figure.

This command will cause the axes to be moved to parking position. The command is activated by clicking the OK button before pressing the “start” pushbutton of the controls panel.

3.2.7 Mandrel rotation

To carry out this command press the key characterized by the following icon with the mouse:

In this way the area on the right will assume this look::



This command allows the mandrel to rotate. To carry out this command in operative mode it is necessary to set:

A The Direction of rotation, selecting it from the curtain window.

B The Speed of rotation, expressed in revs per minute, to write into the entrance box.

C The start of the internal water of the mandrel by putting the pointer on the relevant box.

D The start of the external water of the mandrel, putting the pointer on the relevant box.

Then press the OK key with the mouse and then push the START key on the command panel.

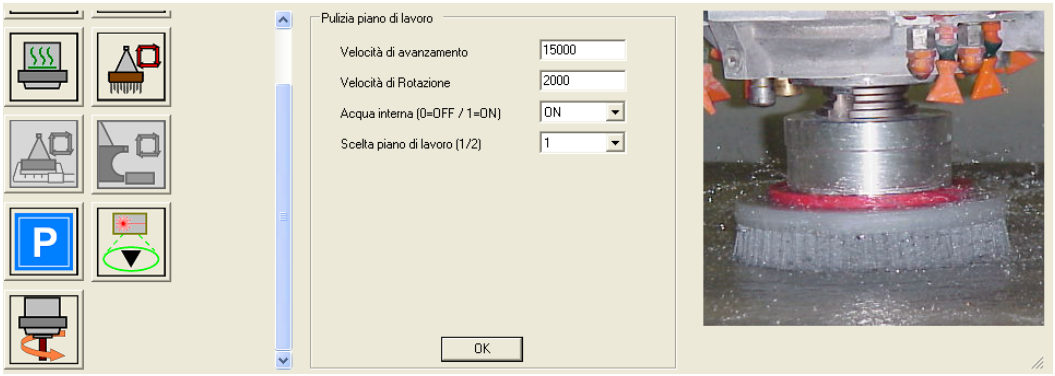
Rotation is allowed only with the tool mounted on the mandrel, and the speed of rotation must be admissible for the tool.

The data entry fields for the Master Twin machine are present for each of the two mandrels.

3.2.8 Cleaning the work surface

To carry out this command press the icon characterized by the following icon with the mouse:

In this way the area on the right will assume this look:



This command allows cleaning the work surface, with the suitable element mounted on the mandrel. To carry out this command in an operative manner it is necessary to set:

A The Speed of advancement during cleaning, to write in the entry box.

B The Speed of Rotation, expressed in revs per minute, to write in the entry box.

C The start of the internal water of the mandrel, selected from the curtain menu.

D The choice of the work surface, selecting from the curtain menu.

Then press the OK key with the mouse and then press the START key on the command panel.

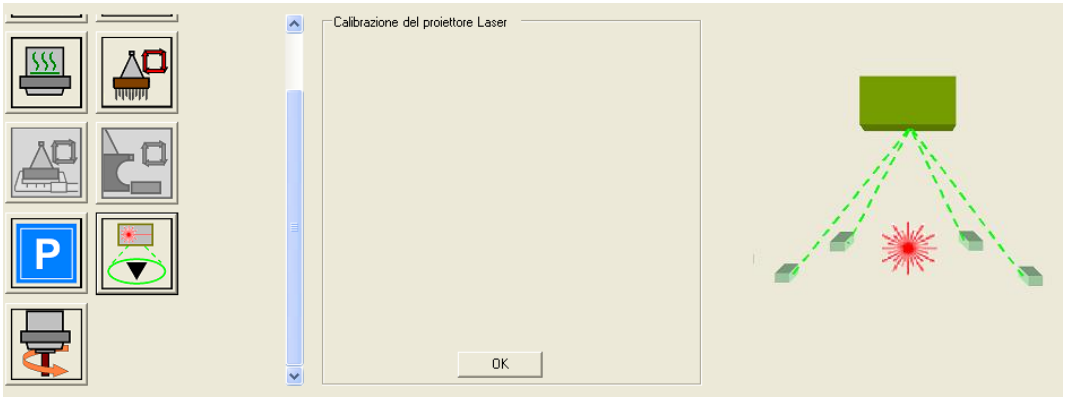
The element on the Master Twin machine must be mounted on the primary mandrel.

3.2.9 Calibrating the laser projector

To carry out this operation, press the key characterized by the following icon with the mouse:

In this way the area on the right will assume this look:

:



This command allows calibrating the laser projector, revealing the position of the fixed reflectors mounted on the machine. To carry out this command in an operative manner it is necessary to press the OK key and then press the START key on the command panel.

Wait until the projector has shown the four reflectors.

3.2.10 Orientating the mandrels for the MASTER TWIN machine

To carry out this command, press the key characterized by the following icon with the mouse:

In this way the area on the right will assume this look:

This command allows positioning the mandrels in the position of the selected direction. To carry out this command in an operative manner it is necessary to set:

A The position of direction of the primary mandrel, selecting it from the curtain menu.

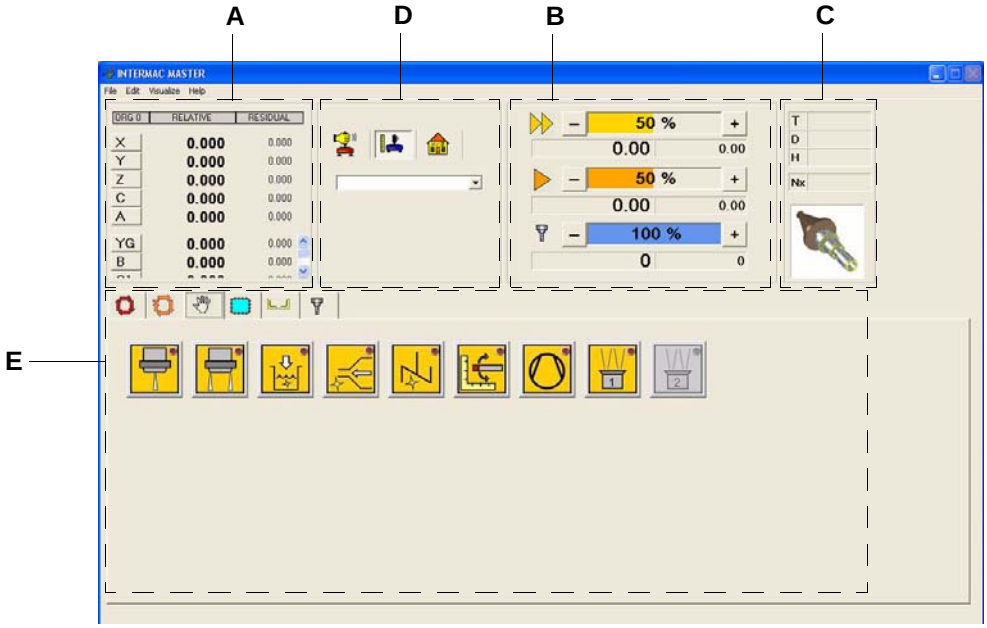
B The position of direction of the secondary mandrel, selecting it from the curtain menu.

Then press the OK key with the mouse and then press the START key on the command panel.

4 Manual environment

Enter the manual environment by clicking the mouse on the icon illustrated below.

While in the manual environment it is possible to move manually along the axes and to perform a series of manual operations.



The manual environment comprises the following areas:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D Displacements area;

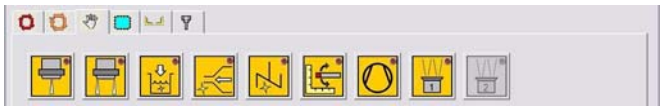
E “Commands area”.

The first three areas are common to all environments and their descriptions are to be found in chapter 1.

The displacements area appears also in the semiautomatic in the tracking environments and a description of it has been given in chapter 3.

4.1 Commands area

The commands area is located at the bottom of the page and comprises a series of commands whose presence or activation depends on the configuration of the machine:



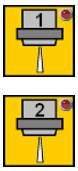
4.1.1 Internal water

Give this command by clicking the mouse on the icon illustrated below:

This command will activate or deactivate the internal jet of water needed to cool the tool. At every pressure the command is activated, if it is deactivated, or vice versa.

This command will activate the internal water flow necessary to cool the tool. The command acts immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

Two commands are present for the Master Twin, one for the primary mandrel and one for the secondary mandrel.



1 = Activation or deactivation of the internal water of the primary mandrel

2 = Activation or deactivation of the internal water of the secondary mandrel

4.1.2 External water

Give this command by clicking the mouse on the icon illustrated below:

This command will activate the external water flow necessary to cool the tool. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

Two commands are present for the Master Twin, one for the primary mandrel and one for the secondary mandrel.

1 = Activation or deactivation of the internal water of the primary mandrel

2 = Activation or deactivation of the internal water of the secondary mandrel

4.1.3 Cerium pump

Give this command by clicking the mouse on the icon illustrated below:

This command starts the pump which conveys the cerium mixture form the lower (ground level) reservoir to the reservoir mounted on the machine. The pump will work for as long as the “Cerium pump” button is kept under the click of the mouse.

4.1.4 Cerium channel cleaning

Give the command by clicking the mouse on the icon illustrated below:

This command is used for the cleaning up operations of the line taking the cerium from the tank on the machine to the spindle. Eseguendo questo comando viene iniettata acqua per il tempo necessario alla pulizia del canale. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

4.1.5 Cerium mixer

Give the command by clicking the mouse on the icon illustrated below:

This command will stir the cerium oxide and water mixture present in the two reservoirs. Unless stirred, the cerium oxide would settle at the bottom of the tanks. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

4.1.6 Fixed tracer

Give the command by clicking the mouse on the icon illustrated below:

This command will move the fixed feeler in one or the other of the allowed positions (upper and lower). Before giving the command, make sure that the operating head is in the appropriate position.

4.1.7 Vacuum pump

Give the command by clicking the mouse on the icon illustrated below:

This command turns the vacuum pump on or off. Depression is therefore obtained on the taps that fix abutting ends and suctions cups to the work surface. At each pressure the pump is turned on, if it is turned off, and vice versa. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

4.1.8 Station 1 air blow

Give the command by clicking the mouse on the icon illustrated below:

This command will activate, for station 1, an air blow to act between suction cup and workpiece, thus creating an air cushion on which the workpiece can glide when moved about the worktable. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

When operating single station, the command will also activate the air blow of station 2.

4.1.9 Station 2 air blow

Give the command by clicking the mouse on the icon illustrated below:

This command will activate, for station 2, an air blow to act between suction cup and workpiece, thus creating an air cushion on which the workpiece can glide when moved about the worktable. The command will act immediately, and it is therefore not required to press the “start” pushbutton of the controls panel.

When operating single station, this command will be disabled.

4.1.10 Selection of the division of the vacuum for the engraving machine (if envisaged)

To carry out this command press the key with the mouse which will show these two icons:

This command will activate the division of the vacuum in the two work stations according to a “right-left” or forward-back” scheme.

4.1.11 Associated internal water (if envisaged)

To carry out this command press the key characterized by the following icon with the mouse:

This command will activate the jet of internal water needed to cool the associated water.

This command acts immediately, i.e. it is not necessary to press the “start” key on the command panel.

4.1.12 Closure magazine on board head (if envisaged)

To carry out this command press the key characterized by the following icon with the mouse:

This command will command the magazine on board head in the repose position. This command acts immediately, i.e. it is not necessary to press the “start” key on the command panel.

4.1.13 Opening magazine on board head (if envisaged)

To carry out this command press the key characterized by the following icon with the mouse:

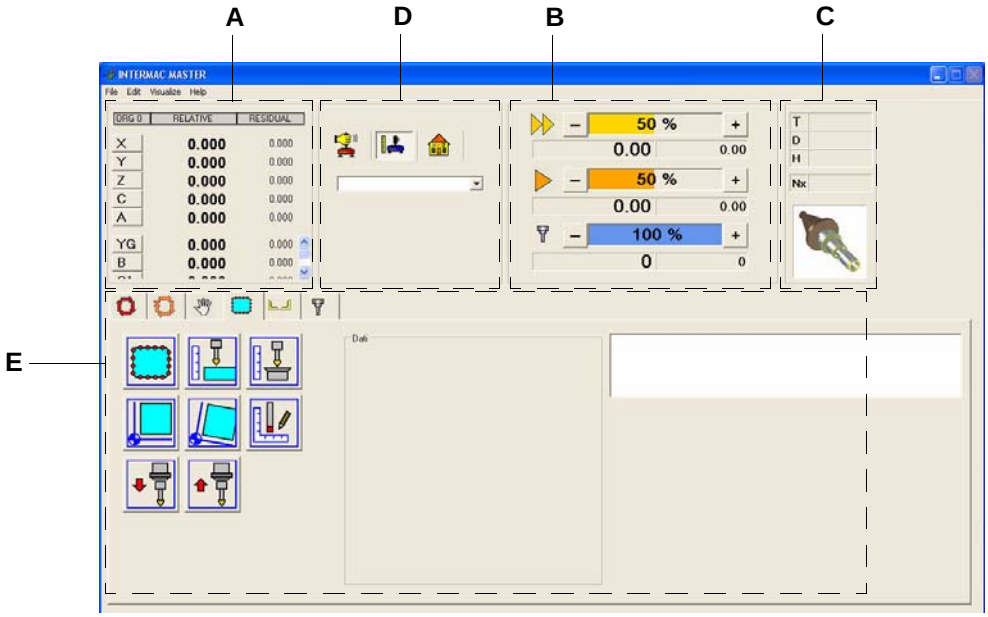
This command will command the magazine on board head in the load/unload position.

This command acts immediately, i.e. it is not necessary to press the “start” key on the command panel.

5 Tracking environment

Enter the tracking environment by clicking the mouse on the icon illustrated herebelow.

When in the tracking environment it becomes possible to move the axes in manual and an track a template or a workpiece resting on the worktable. The data are acquired by means of a removable tracer mounted on the operating head, or by the fixed tracer (if present). Note that the fixed tracer can be utilized for a limited number of operations.



The tracking environment comprises the following areas:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D Displacements area;

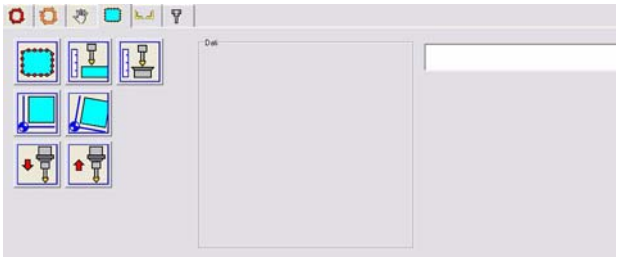
E “Commands area”.

The first three areas are common to all environments and their descriptions are to be found in chapter 1.

The displacements area appears also in the semiautomatic in the manual environments and a description of it has been given in chapter 3.

5.1 Commands area

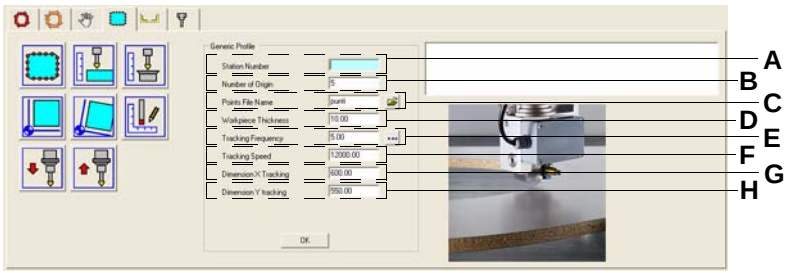
The commands area is to be found in the lower part of the work page. On the left side there are the buttons representing the various commands, while the central area will be modified according to the command which has been selected. To the right of this there will be shown messages about the operations performed by the software. Under the messages there will be shown an image referring to the command just executed.



5.1.1 Generic profile

This command is given by clicking the mouse on the icon illustrated herebelow:

The central area will now look as illustrated in the following figure.



This command will make it possible to track generic profile templates resting on the worktable. The data are acquired by means of a removable tracer mounted on the operating head.

The following parameters, which appear in the central area, must be set before proceeding with the tracking.

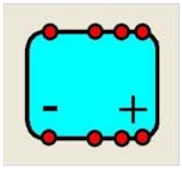
A **Station number:** represents the station (0, 1 or 2) where tracking is to take place.
0 = single station, 1 = station 1, 2 = station 2
The following data will define the vacuum distribution:
0 = vacuum present over the whole worktable
1 = vacuum present in station 1
2 = vacuum present in station 2

B **Number of origin:** represents the origin the acquired data will be referred to.

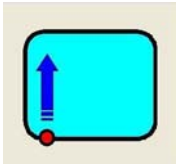
C **Points file name:** represents the name of the file the acquired data will be saved in.

D **Workpiece thickness:** represents the thickness of the workpiece. If unknown, it can be measured using the “workpiece thickness” command (see the section dealing with this item).

E **Tracking frequency:** represents the frequency with which the machine will take a measurement along the template profile. The shorter the interval between steps, the more accurate will be the tracking of he profile, and the longer the time taken by the tracking cycle.



F **Tracking speed:** represents the speed at which tracking is taking place. Its actual value depends on the tracking frequency.



G **Dimension X tracking:** represents the distance the machine must cover during tracking along the X axis. This dimension must always be greater than the X dimension of the template under consideration.

H **Dimension Y tracking:** represents the distance the machine must cover during tracking along the Y axis. This dimension must always be greater than the X dimension of the template under consideration.

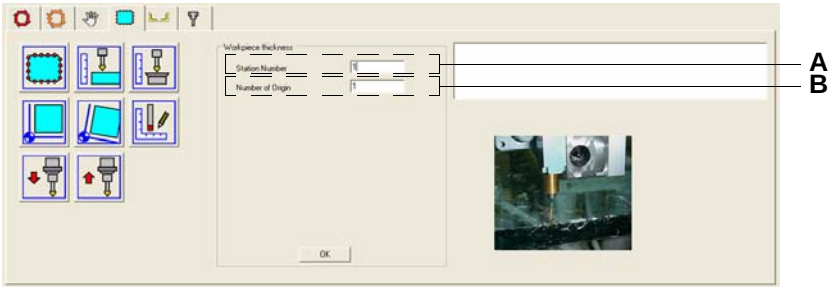
Once the parameters have been set, the OK button must be clicked so that tracking can start when pushbutton “start” is pressed on the control panel.

At this point the operator will be prompted by messages to position manually the operating head in the correct tracking position.

5.1.2 Workpiece thickness

This command is given by clicking the mouse on the icon illustrated herebelow:

The central area will now look as illustrated in the following figure.



With this command a measurement of the thickness of the workpiece resting on the worktable can be taken. The value thus obtained will be stored in the origins table, next to the selected origin, in the “Workpiece thickness” column.

The measurement is taken with a removable tracer mounted by the operator on the operating head for the purpose.

The parameters that must be set to take the measurement of the workpiece thickness, appearing in the central area, are:

A **Station number:** represents the station (0, 1 or 2) where tracking is to take place.
0 = single station, 1 = station 1, 2 = station 2
The following data will define the vacuum distribution:
0 = vacuum present over the whole worktable
1 = vacuum present in station 1
2 = vacuum present in station 2

B **Number of origin:** represents the origin the acquired data will be referred to.

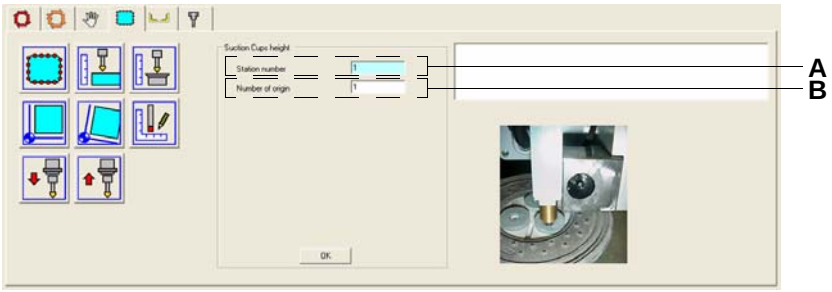
Once these parameters have been set, the OK button must be clicked so that the measurement can be taken when pushbutton “start” is pressed on the control panel.

At this point messages will ask the operator to position the operating head in the correctly for the measurement to be taken.

5.1.3 Suction cups height

This command is given by clicking the mouse on the icon illustrated herebelow:

The central area will now look as illustrated in the following figure.



The height of the suction cups required to fix the workpiece on the worktable is determined through this command. The value thus obtained will be stored in the origins table, next to the selected origin, in the “Suction cups height” column.

The measurement is taken with a removable tracer mounted by the operator on the operating head for the purpose.

The parameters that must be set to take the measurement of the suction cups height, appearing in the central area, are:

A **Station number:** represents the station (0, 1 or 2) where the measurement is to take place.
0 = single station, 1 = station 1, 2 = station 2
The following data will define the vacuum distribution:
0 = vacuum present over the whole worktable
1 = vacuum present in station 1
2 = vacuum present in station 2

B **Number of origin:** represents the origin the acquired data will be referred to.

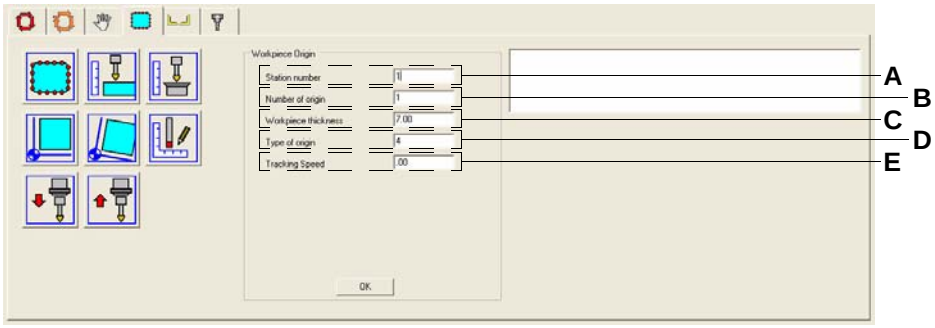
Once these parameters have been set, the OK button must be clicked so that the measurement can be taken when pushbutton “start” is pressed on the control panel.

At this point messages will ask the operator to position the operating head in the correctly for the measurement to be taken.

5.1.4 Workpiece origin

This command is given by clicking the mouse on the icon illustrated herebelow:

The central area will now look as illustrated in the following figure.



This command is used to determine the position of the origin for a workpiece resting on the worktable by means of a removable tracer, which will have been mounted on the operating head by the operator for this very purpose. Alternatively, the fixed tracer can be utilized, provided its use has been specified for the origin of the workpiece in question. The eventual use of the fixed tracer is dependent on how any one origin has been set in the origins table.

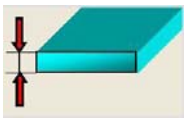
The operating head takes the measurement from two points, one on each side of the workpiece. It is presumed that the sides forming the edge are at right angle.

The parameters appearing in the central area are those necessary for he execution of the command and must be set accordingly. They are:

A **Station number:** represents the station (0, 1 or 2) where the measurement is to take place.
0 = single station, 1 = station 1, 2 = station 2
The following data will define the vacuum distribution on the machine.
0 = vacuum present over the whole worktable
1 = vacuum present in station 1
2 = vacuum present in station 2

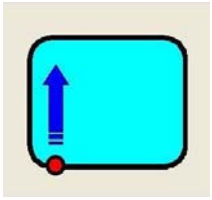
B **Number of origin:** represents the origin the acquired data will be referred to.

C **Workpiece thickness:** represents the thickness of the workpiece. If unknown, it can be measured using the “workpiece thickness” command (see the section dealing with this item).



D **Type of origin:** tells which of the four corners of the workpiece is to be considered the origin (see figure below).

E **Tracking speed:** is the speed at which the measurement is to take place.

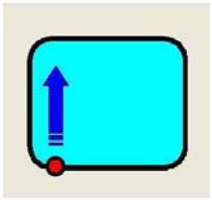


Once these parameters have been set, the OK button must be clicked so that the measurement can be taken when pushbutton “start” is pressed on the control panel.

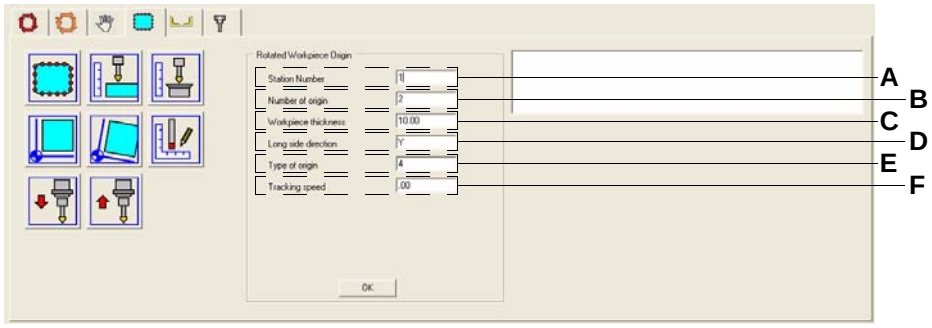
At this point messages will ask the operator to place the operating head manually in the correct position for the measurement to be taken.

5.1.5 Rotated workpiece origin

This command is given by clicking the mouse on the icon illustrated herebelow:



The central area will now look as illustrated in the following figure.



This command is used to determine the position of the origin for a workpiece resting on the worktable by means of a removable tracer, which will have been mounted on the operating head by the operator for this very purpose. Alternatively, the fixed tracer can be utilized, provided its use has been specified for the origin of the workpiece in question. The eventual use of the fixed tracer is dependent on how any one origin has been set in the origins table.

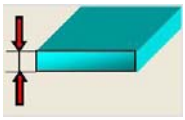
The operating head takes the measurement from three points, which are needed to evaluate the angle of rotation: one measurement on the short side and two on the long side of the workpiece.

The parameters appearing in the central area are those necessary for he execution of the command and must be set accordingly. They are:

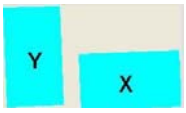
A **Station number:** represents the station (0, 1 or 2) where the measurement is to take place.
0 = single station, 1 = station 1, 2 = station 2
The following data will define the vacuum distribution on the machine:
0 = vacuum present over the whole worktable
1 = vacuum present in station 1
2 = vacuum present in station 2

B **Number of origin:** represents the origin the acquired data will be referred to.

C **Workpiece thickness:** represents the thickness of the workpiece. If unknown, it can be measured using the “Workpiece thickness” command.

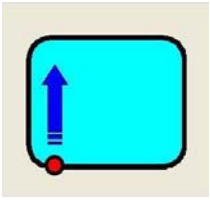


D **Long side direction:** this datum will determine the axis of the longest side. Since two measurements on one side and one on the other are needed to determine the angle of rotation, this information will sort out which of the two sides must be tested twice (the long side). An alphanumeric value must therefore be entered, which must be either X or Y, depending on how the workpiece is lying on the worktable. For a square workpiece either X or Y may be entered.



E **Type of origin:** tells which of the four corners of the workpiece is to be considered the origin (see figure below).

F **Tracking speed:** is the speed at which the measurement is to take place.



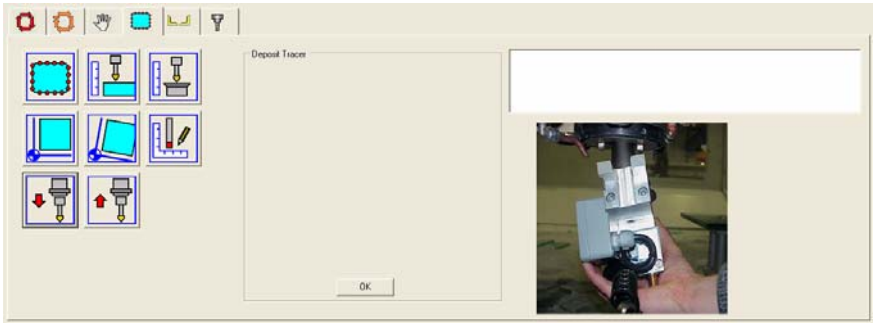
Once these parameters have been set, the OK button must be clicked so that the measurement can be taken when pushbutton “start” is pressed on the control panel.

At this point messages will ask the operator to place the operating head manually in the correct position for the measurement to be taken.

5.1.6 Deposit tracer

This command is given by clicking the mouse on the icon illustrated herebelow:

The central area will now look as illustrated in the following figure.

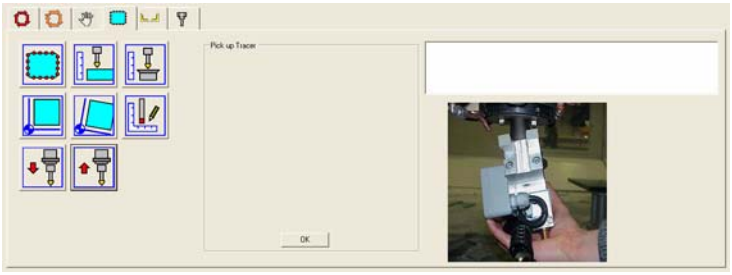


This command is used to position the operating head where the operator can take off the removable tracer.

The command will be executed by clicking the OK button, followed by pressing the “start” pushbutton on the control panel.

5.1.7 Pick up tracer

This command is given by clicking the mouse on the icon illustrated herebelow:



The central area will now look as illustrated in the following figure.

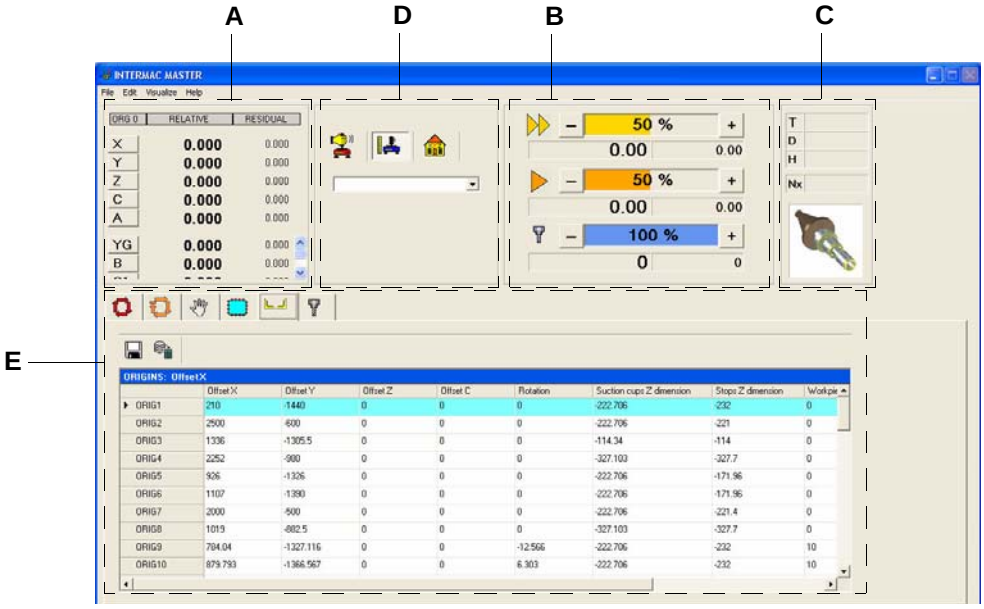
This command is used to position the operating head where the operator can install the removable tracer.

The command will be executed by clicking the OK button, followed by pressing the “start” pushbutton on the control panel.

6 Origins environment

Enter the origins environment by clicking the mouse on the icon illustrated herebelow.

While in the origins environment it is possible to view and modify the table listing all of the origins of a machine.



The origins environment comprises the following areas:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D Displacements area, or ammeter area;

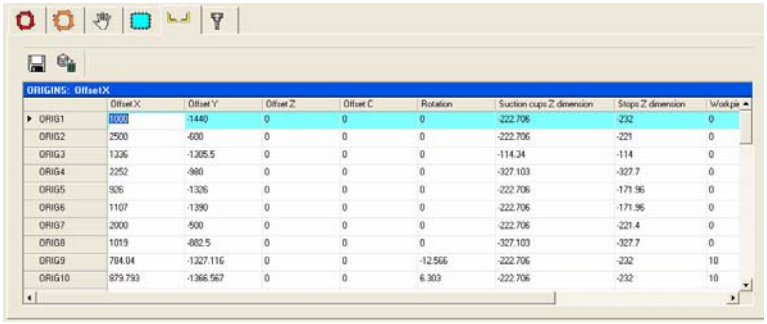
E “Origins table”.

The first three areas are common to all environments and their descriptions are to be found in chapter 1.

The area in the middle is the ammeter area (already described in chapter 2) if the origins environment has been accessed from the automatic environment. In case of access from other environments (tools environment excluded) the ammeter area will be occupied by the displacements area, which has already been described in chapter 3).

6.1 Origins table

The origins table is found in the lower part of the work page. Each line represents a different origin and the columns give the values of the parameters applicable to each origin.



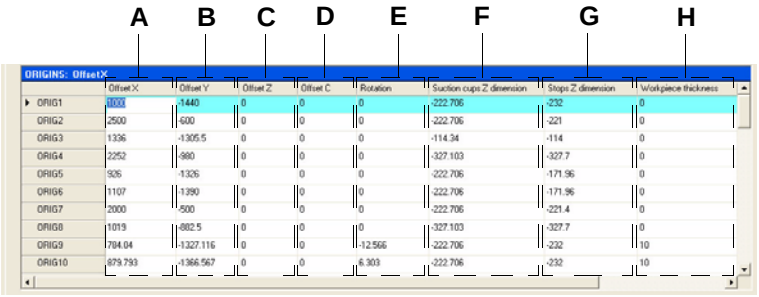
Immediately above the origins table here are two command buttons, identified by the icons shown in the figure below.

The commands are:

A **Save:** to save the changes made to the data in that table.

B **Reload table:** to recall the origins table last saved.

The origins table comprises several columns whose contents are as follows:



A **Offset X:** distance of the origin along the X axis from the machine zero position (home)

B **Offset Y:** distance of the origin along the Y axis from the machine zero position (home)

C **Offset Z:** distance of the origin along the Z axis from the machine zero position (home)

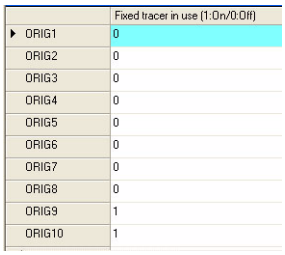
D **Offset C:** angular distance of the origin from the machine zero position (home).

E **Rotation:** representing the rotation of the origin relative to the machine worktable surface plane.

F **Suction cups Z direction:** value of the current setting of the suction cups. The value is automatically entered in the origins table after tracing the suction cups height with command "Suction cups height" as explained in chapter 5. The operator has however the possibility to change this value.

G **Stops Z direction:** value of the current setting of the stops. The value, which is automatically entered equal to the value found with command “Suction cups height” in the tracking environment, can however be modified later by the operator according to his own specific requirements.

H **Workpiece thickness:** thickness of the workpiece to which the origin indicated in the line refers. This value, which is automatically entered in the origins table after the workpiece thickness has been measured with command “Workpiece thickness”, can however be entered and modified by the operator.



	Fixed tracer in use (1:On/0:Off)
ORIG1	0
ORIG2	0
ORIG3	0
ORIG4	0
ORIG5	0
ORIG6	0
ORIG7	0
ORIG8	0
ORIG9	1
ORIG10	1

I **Fixed tracer in use:** indicates for the origin specified in the same line the possibility of using the fixed tracer to determine the origin of the workpiece lying near that origin.
1: fixed tracer can be used
0: fixed tracer cannot be used (in this case only the removable tracer can be used).

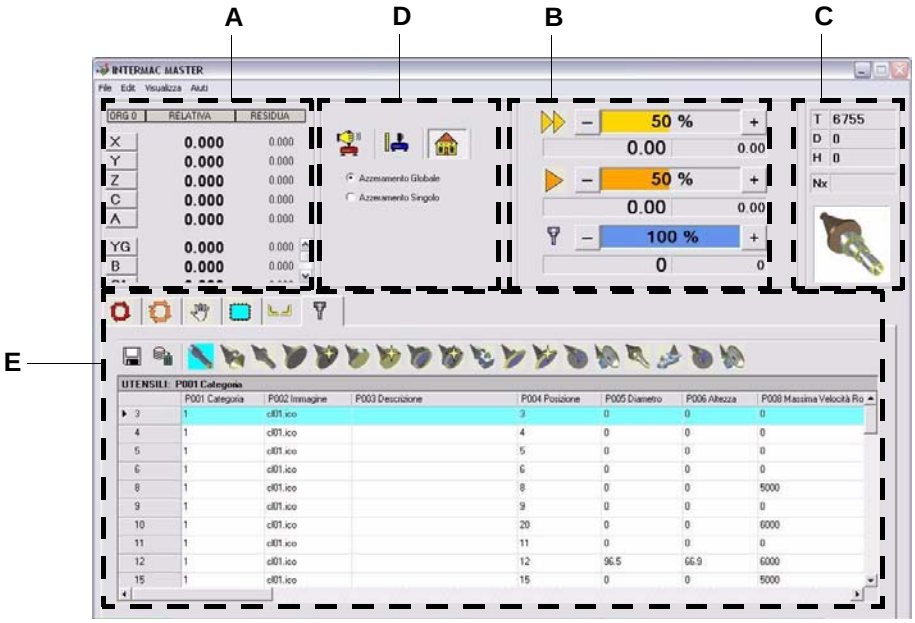
7 Tools environment

Enter the tools environment by clicking the mouse on the icon illustrated herebelow.

While in the tools environment it is possible to view and modify the table listing all of the tools of a machine.

The table is organized by tool category. Above the table are found all the buttons corresponding to all the tool categories that can be present in the magazine. When the mouse is clicked on the button of a specific category, the table will be filled line by line with all the tools and relative parameters answering that category.

Since many tools have in common the same parameters, this manual will list the tool categories first, then the parameters, specifying when necessary if the parameter in question belongs to a particular category.



The tools environment comprises the following areas:

A “Axes tracking area”;

B “Speeds area”;

C “Tools area”;

D Displacements area, or ammeter area;

E “Tools categories”;

F “Tools table”.

The first three areas are common to all environments and their descriptions are to be found in chapter 1.

The area in the middle is the ammeter area (already described in chapter 2) if the tools environment has been accessed from the automatic environment. In case of access from other environments (origins environment excluded) the ammeter area will be occupied by the displacements area, which has already been described in chapter 3).

7.1 Tools categories

The buttons corresponding to the categories of tools are illustrated in the figure below. Polishing tools are marked with a small golden star. The button of the category which has been selected will assume a blue background color.

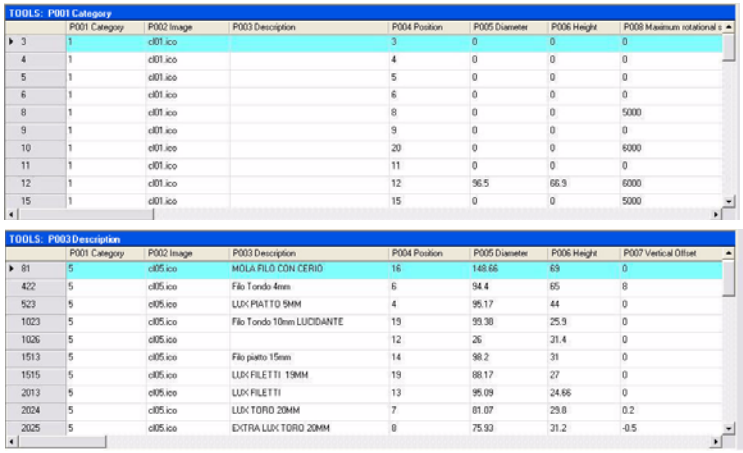
1. **Category 1:** Drill 

2. **Category 2:** Flaring tool 
3. **Category 3:** Milling tool 
4. **Category 4:** Diamond, for edges 
5. **Category 5:** Edge polishing 
6. **Category 6:** Diamond, for steps 
7. **Category 7:** Polishing, for steps 
8. **Category 8:** Diamond, for bevels 
9. **Category 9:** Polishing, for bevels 
10. **Category 10:** Aggregate for lateral engraving 
11. **Category 11:** Diamond, for grooves (Master 34 excluded) 
12. **Category 12:** Polishing, for grooves (Master 34 excluded) 
13. **Category 13:** Cutting disc 

14. **Category 15:** Cambered sawing disc 
15. **Category 16:** Wheel (Master 34 only) 
16. **Category 17:** HERO Drill 
17. **Category 18:** Lower drill 
18. **Category 19:** Cutting disc with angular drive 
19. **Category 20:** Cambered sawing disc with angular drive 
20. **Category 21:** Diamond incision (only for Master 34) 
21. **Category 22:** Polishing incision (only for Master 34) 
22. **Category 23:** Writing point (only for Master 34) 
23. **Category 24:** Cutting disc (only for Master 34) 
24. **Category 25:** Associated diamonded bowl grinder 
25. **Category 26:** Associated polishing bowl grinder 

7.2 Tools table

The table will change according to which category is selected. See as an example the following two figures.



TOOLS: P001 Category

	P001 Category	P002 Image	P003 Description	P004 Position	P005 Diameter	P006 Height	P008 Maximum rotational s
▸ 3	1	cl01.ico		3	0	0	0
4	1	cl01.ico		4	0	0	0
5	1	cl01.ico		5	0	0	0
6	1	cl01.ico		6	0	0	0
8	1	cl01.ico		8	0	0	5000
9	1	cl01.ico		9	0	0	0
10	1	cl01.ico		20	0	0	6000
11	1	cl01.ico		11	0	0	0
12	1	cl01.ico		12	96.5	66.9	6000
15	1	cl01.ico		15	0	0	5000

TOOLS: P003 Description

	P001 Category	P002 Image	P003 Description	P004 Position	P005 Diameter	P006 Height	P007 Vertical Offset
▸ 81	5	cl05.ico	MOLA FILO CON CERIO	16	148.66	69	0
422	5	cl05.ico	Filo Tondo 4mm	6	94.4	65	8
523	5	cl05.ico	LUX PIATTO 9MM	4	95.17	44	0
1023	5	cl05.ico	Filo Tondo 10mm LUCIDANTE	19	99.38	25.9	0
1026	5	cl05.ico		12	26	31.4	0
1513	5	cl05.ico	Filo piatto 15mm	14	98.2	31	0
1515	5	cl05.ico	LUX FILETTI 19MM	19	88.17	27	0
2013	5	cl05.ico	LUX FILETTI	13	95.09	24.66	0
2024	5	cl05.ico	LUX TORO 20MM	7	81.07	29.8	0.2
2025	5	cl05.ico	EXTRA LUX TORO 20MM	8	75.93	31.2	-0.5

The parameters values in the table columns are changed by clicking them one by one and entering the new value. A new value can be made permanent by clicking the “save” button.

Changes to the parameters values which have not already been saved can eventually be deleted by clicking the “reload table” button.

7.2.1 Tools parameters

As already mentioned, tools parameters are organized in columns and vary according to the category of the tool on display. However, many of them are common to several categories and, as such, are listed in strict increasing order. Unless specified to the contrary, it is understood that the parameter under consideration belongs to all, or to the majority, of tool categories. For particular or specific parameters, the categories to which they belong are clearly indicated.

To view all the parameters of each individual tool, use the horizontal scroll bar at the bottom of the table.

P001 **Category:**
number representing the type of tool associated to the code. The categories of the tools in the table may vary according to machine types.

P002 **Image:**
is the illustration of the tool type. Each tool is automatically assigned an image on the basis of the category to which it belongs; however, the operator may select a different image better suited to represent the specific tool. The image associated to the selected tool is displayed in the tools area (see chapter 1, paragraph “Tools area”).

P003 **Description:**
space dedicated to the description of the tool. Numeric and/or alphanumeric characters may be used indiscriminately.

P004 **Position:**
number indicating the position of the tool in the magazine. Warning: each position may be assigned more than one tool code. The operator must take care that the correct tool is present in each position.

P005 **Diameter:**
is the diameter of the tool.
The value that must be entered for a tool with a shaped profile (e.g. a V or a TP profile) is that of the smaller tool diameter.

P006 **Height:**
indicates the working height of the tool.
The method to determine the height of a tool varies according to type.

P007 **Vertical Offset:**
indicates a vertical displacement relative to the normal working height of the tool. Entering a positive value makes the tool position itself higher than the set value. Entering a negative value makes the tool position itself lower than the set value.

P008 **Maximum rotational speed:**
indicates the maximum number of rpm the tool can work at.
If the program asks for a rotational speed which is higher than the value set for this parameter, the working cycle will not take place and an error message will appear.

P009 **Maximum Current [A]:**
a value which is a function of the current taken by the spindle.
If this value is exceeded in the course of a machining operation, the program will be interrupted.

P010 **Nominal Current [A]:**
a value which is a function of the current taken by the spindle.
Represents the optimal current that should be taken by the spindle during machining operations.

P011 **Tolerance Range [A]:**
represents the tolerance range relative to the nominal current (P010) within which the system will consider the absorption normal.
If the nominal current absorption is exceeded by one half the value of the range, the system will slowdown the feed to return a value within the range. If this measure causes the current to drop below the nominal value by one half the range value, the system will automatically increase the feed to return the value within range, and anyway not over the value of the set speed, due consideration being given to the override setting.

Example:
given P010=10 and P011=4, the system will check that the current does not exceed 10+(4/2)=12. If value 12 is exceeded, the feed will be reduced to bring it back below this level. Should the value fall below 10-(4/2)=8, feed will be increased to bring it back within the range.

P012 **Oscillation Range:**
indicates the height of the profile of the oscillating tool to be used.
The oscillation becomes active only if a value greater than the workpiece thickness is entered. This parameter is to be used only with tools having a flat profile.

P013 **Oscillation Speed:**
indicates the speed at which the tool is oscillating when the oscillation mode is active.

P014 **Tool Life:**
its value represents the maximum distance the tool can work before a replacement is needed. The value is expressed in meters.

P015 **Space Traveled:**
indicates the distance traveled by the tool while actually engaged in a machining operation. The value is constantly updated by the system.
When the distance traveled exceeds the life of the tool (P014), a message will appear to remind the operator that it is time to replace it.
If the alternative tool function is active, the system will perform the next machining operation with the tool specified by parameter P029.
The value is expressed in meters.

P016 **Preset Interval:**
indicates the number of machining operations performed by the tool after which an automatic dimensional check of the tool is made.
If set to 0, the system will never perform that check.

Examples:
If set to 1, the system will check automatically before a new operation is started.

If set to 5, the system will automatically check the tool after every 5 machining operations.

P017 **Preset Counter:**
indicates how many machining operations the tool has performed since the last automatic dimensional check.
When the counter gets to the value set on P016 the check takes place automatically and P017 is reset to 0. The system will automatically update this value.

P018 **Preset Type (0/5):**
a number between 0 and 5 to indicate the way in which the dimensions of the tool are checked:

0 = measure diameter and height of tool, while rotating;

1 = measure diameter only, while rotating;

2 = measure height only, while rotating;

3 = measure diameter and height, at standstill;

4 = measure diameter only, at standstill;

5 = measure height only, at standstill.

P019 **Preset Height:**
indicates the distance from the lower tool end where automatic measurement of the radius is taken.

P020 **Preset Radius:**
indicates the distance between the axis of rotation of the tapered shank and the point at which measurement of the tool height is taken.

P022 **Preset Rotational Speed:**
when measuring in rotation, the value indicates in rpm the speed at which the tool must be rotating while the measurement is being taken.
This speed must lower or equal to the speed set in P008.

P023 **Diameter Lower Tolerance:**
This parameter will be operating only if the measured value of the diameter is lower than the setting of (P005). If the difference between the two is not greater than the value of this parameter, the measurement is deemed to be correct. If this is not so, the machine will behave as determined by parameter P027.

Example:
P023=0.1; Tool diameter (P005)=100; Measured diameter=99.9

The system considers acceptable values between 100 and 99.9.

P024 **Diameter Upper Tolerance:**
this parameter will have an effect only if the measured value of the diameter is greater than the setting of (P005).
If the difference between the two is not greater than the value of this parameter, the measurement is deemed to be correct. If this is not so, the machine will behave as determined by parameter P027.

Example:
P024=0.1; Tool diameter (P005)=100; Measured diameter=100.1

The system considers acceptable values between 100 and 100.1.

P025 **Height Lower Tolerance:**
this parameter will have an effect only if the measured value of the height is smaller than the setting of (P006).
If the difference between the two is not greater than the value of this parameter, the measurement is deemed to be correct. If this is not so, the machine will behave as determined by parameter P027.

Example:
P025=0.1; tool height (P006)=100; measured height=99.9

The system considers acceptable values between 100 e 99.9.

P026 **Height Upper Tolerance:**
this parameter will have an effect only if the measured value of the height is greater than the setting of (P006).
If the difference between the two is not greater than the value of this parameter, the measurement is deemed to be correct. If this is not so, the machine will behave as determined by parameter P027.

Example:
P026=0.1; tool height (P006)=100; measured height=100.1

The system considers acceptable values between 100 e 100.1.

P027 **Ignore Wrong Measurement:**
this parameter may have value 0 or 1 and will determine the behavior of the machine in case the tool measurements obtained through tool preset should be out of the set tolerance. P027=1: the system ignores the last measurement taken and carries on machining on the basis of the values held in memory. P027=0: the system ignores the last measurement taken and interrupts machining operations.
Note: before a measurement is considered unacceptable for an out of tolerance, the system will repeat it a number of times. This number is defined in the software (typically 10, but it may vary from machine to machine).

P028 **Spindle Preset Air:**
this parameter may have value 0 or 1. If the value is 1, air is blown out of the spindle during measurement so that the surface of the tool may quickly lose residual dirt. If the value is 0, air is not blown out.
It is advisable to use the function only for tools with internal water ducts.

P029 **Alternative Tool:**
indicates the code of an alternative tool, to be used in case the existing tool reaches the end of its useful life.
If the value is set to 0 the function will remain inactive.

P030 **Dressing Interval:**
indicates the number of holes that will be drilled before the tool needs dressing-up.

P031 **Dressings Counter:**
indicates the number of holes drilled by the tool after the last dressing-up.

P032 **Preset After Dressing:**
if the value is set to 1, a measurement takes place after every dressing-up. If the value is set to 0, no measurement is taken after every dressing-up.

P033 **Bores to DO:**
indicates the maximum number of holes e tool can drill before it needs replacing.

P034 **Bores Done:**
indicates the total number of holes drilled by the tool. When P034 reaches the value set in P033, a message appears to remind the operator that the tool is due for replacement or, if the alternative tool function is active, the system will automatically perform the next operation with the tool specified by parameter P029.

P035 **Distance between Plates:**
represents the distance, in height, between the two maximum diameters of the tool.

P036 **Adaptive thrust (A):**
represents the pressure that the system automatically maintains between tool and workpiece, in order to guarantee a constant polishing effect. This value acts directly on the diameter and/or the height of the tool by modifying them.

P041 **Statistical height wear:**
represents the statistical loss of height of the polishing tool per meter of machining done. The value is expressed in 1/1000 mm.

P042 **Statistical radial wear:**
represents the statistical loss in diameter of the tool per meter of machining done. The value is expressed in 1/1000 mm.

P043 **Grinding cycle (0/1):**
This parameter can have value 1 or 0.
If the value is 1, the system will perform a grinding (dressing-up) cycle on the grinding wheel.
If the value is 0, the dressing up cycle will not be performed.

P044 **Upper rim diameter:**
indicates the diameter of the upper part of the grinding wheel which is not utilized. The datum must be inserted when a new tool is loaded. From then on an automatic update will take place after each grinding operation.

P045 **Lower rim diameter:**
indicates the diameter of the lower part of the grinding wheel which is not utilized. The datum must be inserted when a new tool is loaded. From the on an automatic update will take place after each grinding operation.

P046 **Upper rim thickness:**
indicates the thickness of the upper rim of the grinding wheel which is not utilized. The datum must be inserted when a new tool is loaded. The value must be modified only if the rim thickness should change.

P047 **Lower rim thickness:**
indicates the thickness of the lower rim of the grinding wheel which is not utilized. The datum must be inserted when a new tool is loaded. The value must be modified only if the rim thickness should change.

P048 **Upper rim offset:**
indicates the distance in height between the base of the tapered shank and the high part of the upper rim. The datum must be inserted when a new tool is loaded.

P049 **Lower rim offset:**
indicates the distance in height between the base of the tapered shank and the low part of the lower rim. The datum must be inserted when a new tool is loaded.

P050 **Offset for rim grinding:**
indicates the vertical displacement relative to the grinding height, in order to avoid grinding too near to the dressing bar.

In particular, a value different from 0 requires the wheel to be moved down when grinding the upper rim, and up when grinding the lower rim.

P051 **Max. loss of rim thickness**
indicates the maximum allowable difference between the diameter after the last grinding pass (P052) and the current diameter of the tool. When its value is exceeded, a wheel grinding procedure will be executed. This value also represents the quantity of material which is taken off the rim at each grinding pass.

P052 **Diameter after last grinding pass:**
indicates the tool diameter after the last grinding pass.
The initial setting must be equal to the tool diameter, to be successively updated after each grinding pass.

P053 **Grinding speed:**
indicates the value of feed during the grinding pass.

P054 **Spindle Rpm during grinding:**
indicates the speed of rotation of the tool during the grinding pass, expressed in rpm. The parameter value must always be equal or smaller than the maximum allowed rotational speed of the tool (P008).

P055 **External water during grinding:**
indicates the possibility to enable the flow of external water during grinding.

0 = External water not enabled;
1 = External water enabled.

P056 **A axis maximum angle:**
indicates the maximum value for the angular position of the A axis with the tool on the spindle.

P057 **A axis minimum angle:**
indicates the minimum value for the angular position of the A axis with the tool on the spindle.

P058 **Offset:**
a read-only parameter reserved for Intermac engineers.

P059 **Height of aggregate:**
a read-only parameter reserved for Intermac engineers.

P060 **Aggregate (0/1):**
when set to 1, stands to indicate that the grinding wheel is mounted on the appropriate aggregate.
When set to 0, it stands to indicate that the grinding wheel is directly mounted on the taper.

P061 **Lower flaring tool diameter:**
indicates the diameter of the lower flaring tool.

P062 **Lower flaring tool height:**
indicates the height of the lower flaring tool.
It represents the distance between the base of the taper and the point at which the diameter of the lower flaring tool is measured.

P063 **Upper bore diameter:**
indicates the diameter of the upper drill.

P064 **Upper bore height:**
indicates the height of the upper drill.
It represents the distance between the base of the taper and the end of the larger diameter drill.

P065 **Upper flaring tool diameter:**
indicates the diameter of the upper flaring tool .

P066 **Upper flaring tool height:**
indicates the height of the upper flaring tool.
It represents the distance between the base of the taper and the lower part of the upper flaring tool.

P067 **Lower flaring tool angle:**
indicates the angle of inclination of the lower flaring tool profile.

P068 **Upper flaring tool angle:**
indicates the angle of inclination of the upper flaring tool profile.

P069 **Lower flaring tool stem diameter:**
indicates the diameter of the lower flaring tool stem.

P082 **Height of aggregate:**
is the overall height of the aggregate.
It represents the distance between the base of the taper and the lower part of the aggregate.

P083 **Lower bore diameter:**
represents the diameter of the drill used to make a hole in the lower part of the workpiece.

P084 **Lower bore offset:**
represents the distance between the axes of rotation of the spindle and of the tool.

P085 **Lower bore X offset:**
used when setting up the machining operations to align the lower hole with the upper hole on the workpiece.

P086 **Lower bore aggregate height:**
represents the height of the drill base from the base of the taper.

P087 **Upper flaring time [s]:**
indicates the number of seconds that the upper flaring tool remains in the final position in order to achieve the best smoothing out.

P088 **Upper bore chamfer height:**
indicates the chamfer height of the upper drill.

P090 **Lower bore height:**
indicates the height of the lower drill.
It represents the height of the drill base from the end of the drill itself.

P091 **Grinding wheel support thickness:**
indicates the thickness of the support of the engraving wheel.
The cutting section of the wheel and its central support are often of different thickness.

P094 **Grinding wheel angle:**
indicates the angle between the surface of the workpiece and the profile of the engraving wheel.

P095 **Tools calibration at entry:**
used to vary the length of the drill at entry.
The length of the drill decreases as the value of the parameter is increased, and vice versa.
The amount change in length must be determined by trial and error since it is dependent on many a factor.
It is advisable to modify this parameter only if absolutely necessary.

P096 **Tools calibration at exit:**
used to vary the length of the drill at exit.
The length of the drill decreases as the value of the parameter is increased, and vice versa. The amount of change in length must be determined by trial and error since it is dependent on many a factor.
It is advisable to modify this parameter only if absolutely necessary.

P097 **Groove length calibration:**
used to vary the length of the engraving. The length of the engraving decreases as the value of the parameter is increased, and vice versa.
The amount change in length must be determined by trial and error since it is dependent on many a factor.
It is advisable to modify this parameter only if absolutely necessary.

P098 **Point depth calibration:**
makes it possible to increase or decrease the point diameter and therefore to obtain larger or smaller diameter points.
Example: if the value is set to 0,1, the grinding wheel will descend by 0,1 relative to the value set in CAM, thus increasing the diameter of the point.

P099 **Aggregate C offset:**
angular value of the C axis used to obtain the correct orientation of the aggregate.

P100 **Aggregate pins height:**
indicates the height of the pin to prevent rotation of the aggregate.

P101 **Blade thickness:**
indicates the thickness of the blade of a straight or of a cambered disc.

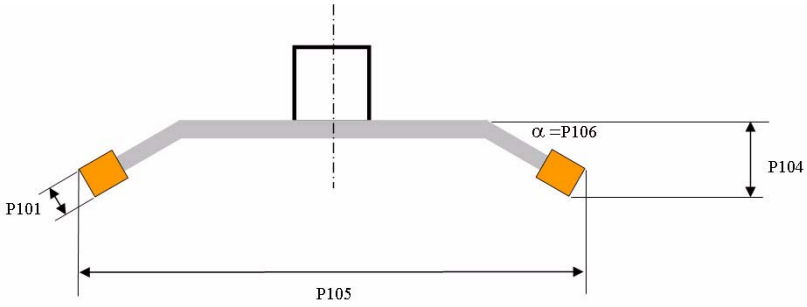
P102 **Aggregate height:**
represents the height of the centre of rotation of the tool from the base of the taper.

P103 **X displacement after change:**
determines an extra displacement along the X axis at the end of a tool loading cycle.
The function is used to make room when loading particularly cumbersome tools so that they will not bump into anything.

P104 **Cambered disc height:**
represents the maximum height of the section of the disc. It may be measured by laying the cutting section of the disc flat on a plane surface and taking the distance between the plane surface and the part of the disc that rests against the aggregate.

P105 **Disc outer diameter:**
indicates the outer diameter of a cambered sawing disc.

P106 **Angle of disc:**
indicates the value of the angle of a cambered sawing disc.
The value of the parameter is determined by the geometrical characteristics of the disc.



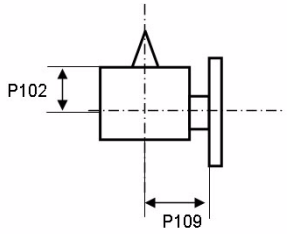
P107 **% reduction for radial wear:**
indicates the percentage allowance for wear to be applied to the diameter of a polishing disc at the end of the machining operation. This parameter avoids scoring the workpiece when the tool first touches it.
If the parameter has value 0 or 100, the whole calculated wear allowance is applied.

Example: if the resulting wear at the end of the machining operation equals 1, with P107 =20 a wear allowance of 0,2 (20% of 1) will be applied.

P108 **% reduction of height for wear:**
indicates the percentage allowance for wear to be applied to the height of a polishing disc at the end of the machining operation. This parameteravoidsscoringtheworkpiecewhenthetoolfirsttouchesit.
If the parameter has value 0 or 100, the whole calculated wear allowance is applied.

Example: if the resulting wear at the end of the machining operation equals 1, with P107 =20 a wear allowance of 0,2 (20% of 1) will be applied.

P109 **Aggregate offset:**
indicates the distance between the axis of the spindle and the aggregate base in contact with the tool.



P110 **Check neighboring positions:**
indicates the intention to check the state of occupancy in the neighboring stations before unloading a tool in the magazine.
The following values are allowed:
0 = check unloading station only.
1 = check both previous and unloading stations.
2 = check both next and unloading stations.
3 = check previous, next and unloading stations.

P111 **Reduction ratio:**
indicates the reduction ratio between the rotational speed of the spindle and that of the tool. The programmed rpm is divided by this number in order to obtain the exact rpm of the tool.

Example:
programmed rpm for the tool = 1000 and P111 = 0.5: the actual spindle rpm is 1000/0.5=2000.

P114 **Minimum diameter:**
indicatesthetoolminimumdiametersuitableformachiningoperations.
If the tool diameter (P005) is equal to or less than this parameter, a message will appear to remind the operator that a tool change is due. Machining operations will be interrupted. Otherwise, provided the alternative tool function is active, the system will proceed with a tool change and resume operations with the tool specified by the code present in parameter P029.
If P114 = zero, the diameter will not be checked.

P115 **Machining point distance:**

Used for millstones that have an unsymmetrical profile with respect to their central axis. Deternines the distance, with a sign, of the machining point with respect to the central axis.

P116 **Diameter:**
Diameter for category 16 tools – Cutting wheel.

P117 **Diameter:**
Diameter for category 23 tools – Master 34 writing point.

P118 **Height:**

Length of the stem for category 23 tools - Master 34 writing point, base of the aggregated to the writing point included.

P119 **Diameter:**
Diameter for category 13 cutting disc.

P120 **Angle on horizontal surface:**
Angle of the aggregate with respect to standard orientation. See use and maintenance manual.

P123 **Anti-collision tool:**
Indicates whether the anti-collision control between the tool and the structure of the machine is activated.

P124 **Maximum overall height:**
Maximum overall height of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual.

P125 **Maximum overall aggregate width:**
Defines tha maximum overall width of the tool or aggragate. It is used in the anti-collision control. See use and maintenance manual.

P126 **Distance between the point and overall horizontal limit:**

Defines the overall maximum limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual.

P127 **QUOTA overall limit in Z- of the aggregate:**

Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual.

P127 **QUOTA overall limit in Z- of the aggregate:**
Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual

P128 **QUOTA overall limit in X+of the aggregate:**
Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual

P129 **QUOTA overall limit in X- of the aggregate:**
Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual

P130 **QUOTA overall limit in Y+of the aggregate:**
Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual

P131 **QUOTA overall limit in Y- of the aggregate:**
Defines the maximum overall limit of the tool or aggregate. It is used in the anti-collision control. See use and maintenance manual

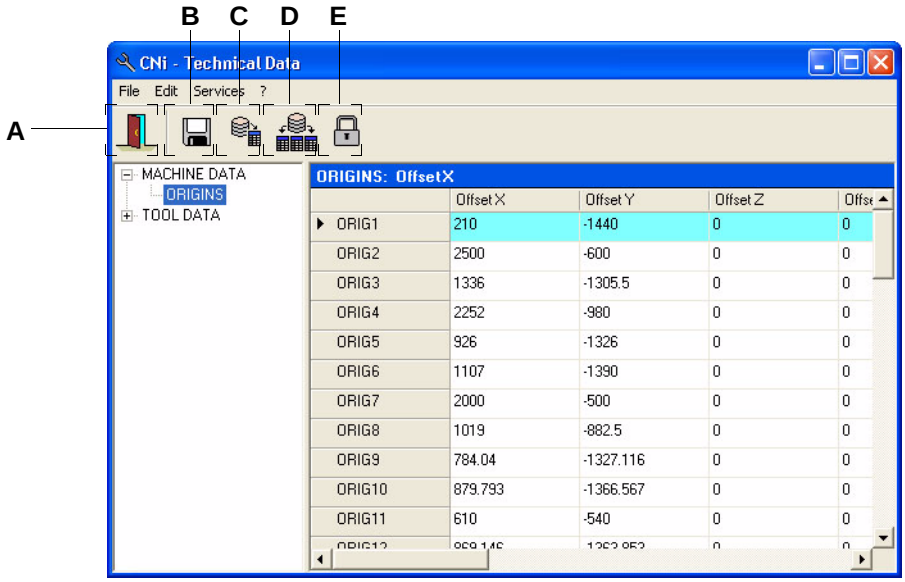
P133 **Width of the disc protection casing:**

Maximum overall limit of the cutting disc protection casing, in the direction of the rotation axis. It is used in the anti-collision control. See use and maintenance manual.

P134 **Width of the disc protection casing:**
Maximum overall limit of the range of the cutting disc protection casing. It is used in the anti-collision control. See use and maintenance manual.

8 CNi application – technical data

CNi – technical data" application is an indispensable tool to learn about and eventually modify parameters of fundamental importance for machine operation. Open the application by selecting START/WRT/SERVERDM. Always close the application when no longer in use.



The menus bar includes 4 items:

A **Exit:** to exit the application.

B **Save:** to save the current data configuration.

C **Reload table:** to reload from file the last saved version of the table on display.

D **Reload all:** to reload from file all the tables for consultation.

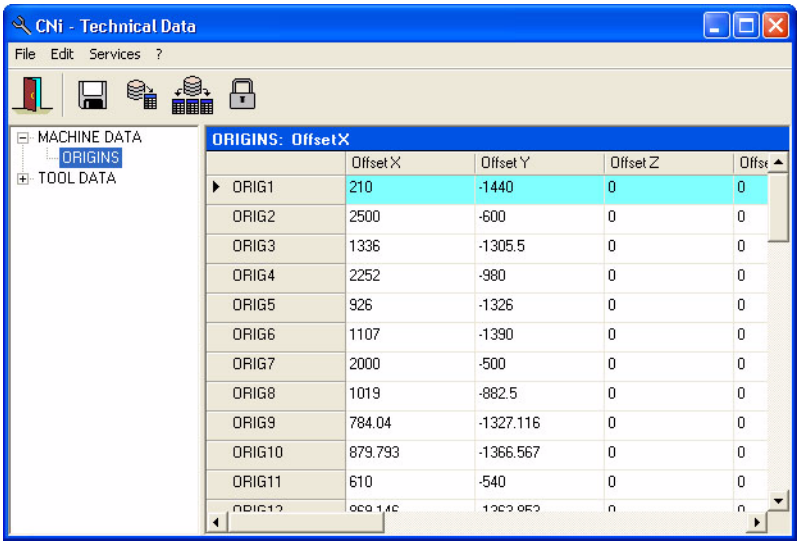
E **Password:** to be entered to go up one level in the software. This manual deals with level 1, which is the basic level.

The main body of the application contains all the information in a tree structure and comprises the following items:

- "Machine data";
- "Tool data".

8.1 Machine data

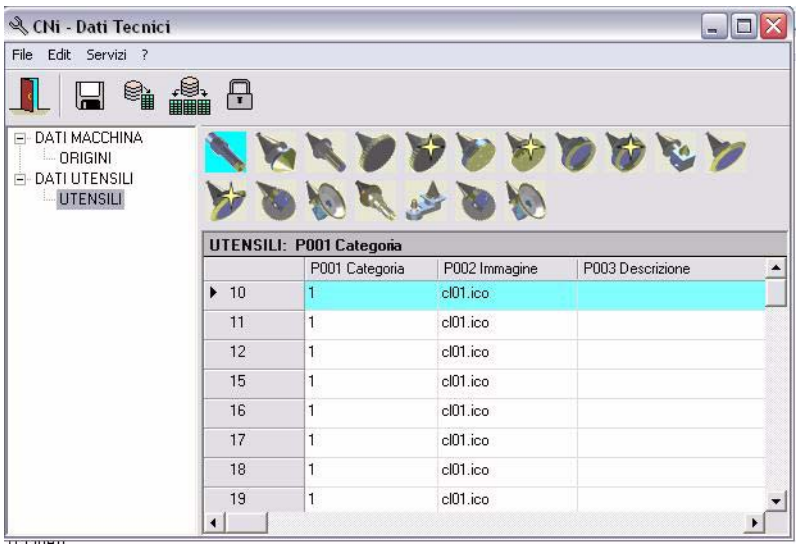
The only item present in the machine data field is the item ORIGINS.



ORIGINS presents a table exactly the same as that already described in detail in chapter 6. See that chapter for further information.

8.2 Tool data

The only item present in the tool data field is the item TOOLS.



The tool table lists the various tool categories. A detailed description of the tool data has already been given in chapter 7.
See that chapter for further information.

9 MergeIso

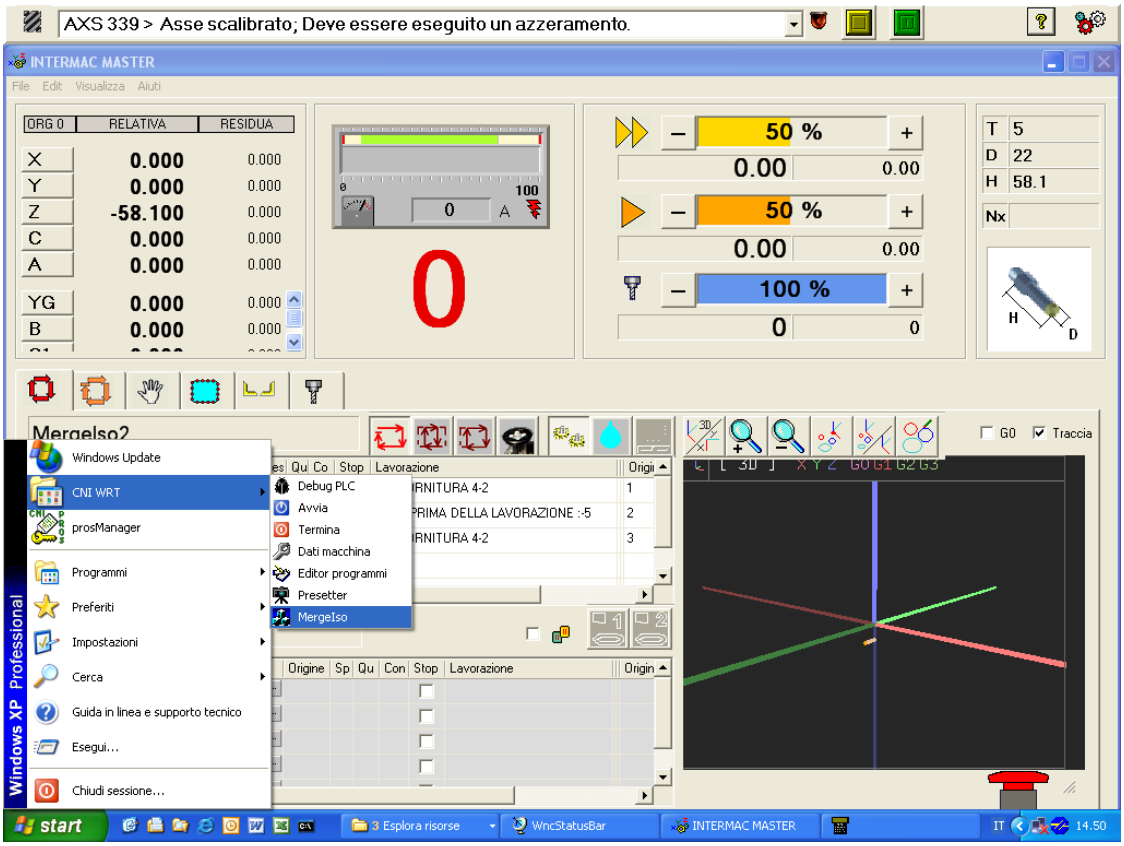
The purpose of the MergeIso software is to generate a work program obtained by uniting other work programs with the intention of carrying out the **least possible number of tool changes**. All the tools are considered “different” with different codes, independent of their position in the magazine.

Since the purpose is to reduce the total machining time, it is thought unnecessary to use the parts not strictly tied to machining (positioning abutting end and suction cups, etc.) and are therefore ignored, i.e. do not appear in the optimized Iso program. This means that, for example, in order to carry out placing abutting ends and suctions cups it will be necessary to use the single machining programs with the usual method of use.

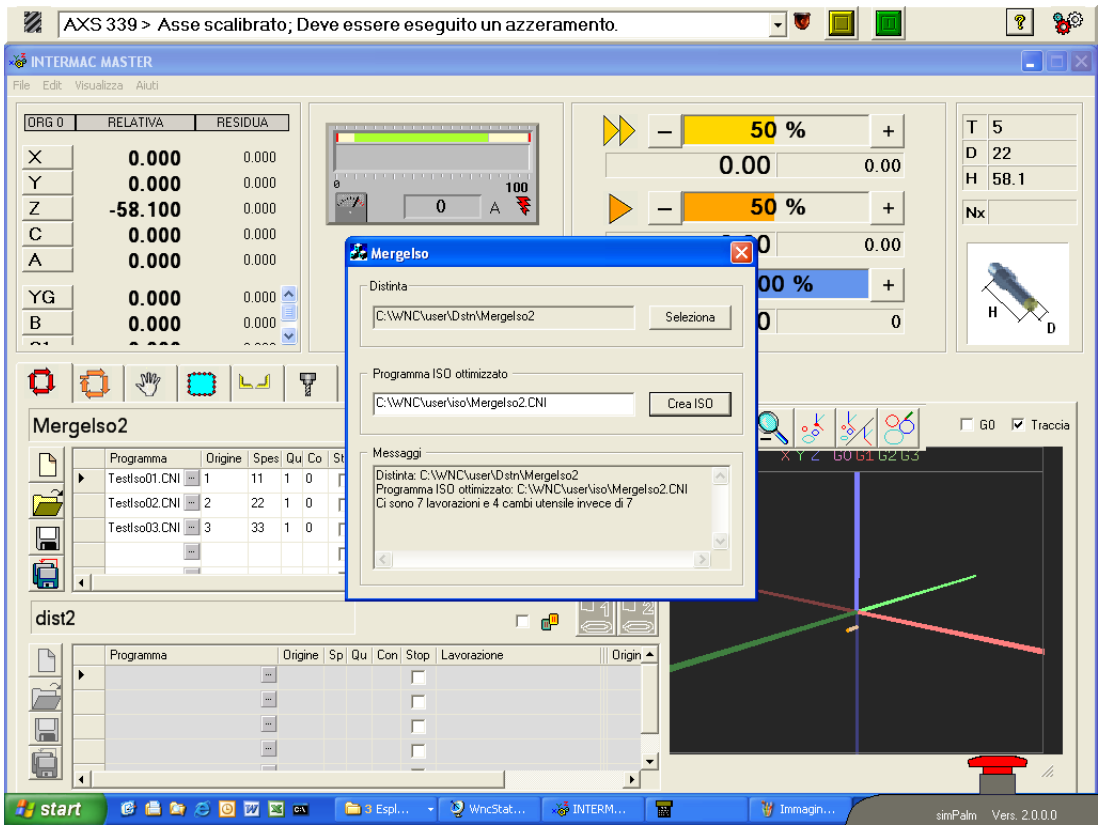
9.1 Method of use

1. The operator compiles the list of programs that you intend saving with a name at your discretion. This operation is carried out according to the standard method of using the machine.

2. The operator selects the “MergeIso”, program situated at the same level as the “Machine Data” program.



3. The program visualizes the insertion and data elaboration window. The operator presses the **Selection** key and selects the list that you intend optimizing, then presses the **Create ISO** key. The software carries out the elaboration requested, i.e. generates the optimized Iso file. This file has the same name as the list and extension “.cni” and is situated in the predefined directory for Iso programs. At the end of the elaboration a confirmation message is generated with the indication of the number of tool changes carried out. If the elaboration fails the relative error message is shown.



4. The operator closes the MergeIso program (with the X upper right of the relative window), adds at the bottom of the list (in the first line available) the name of the optimized file, selects it and puts it into operation according to the standard method of using the machine.
   In the line of the list that contains the optimized program the following data has to be inserted:
   - Origin: 1
   - Thickness: 1
   - Quantity: at the client's choice, in any case a value higher than 0.

In any case **the origins and thicknesses that are used during machining are those of the single programs from which you have started to generate the optimized program**. The values inserted in the line that contains the optimized program are only to make carrying out the program possible.

Important note: Every time the operator changes a datum of any starting program, it is necessary to carry out the optimization again.

Analytical Index