INSTALLATION, OPERATION AND MAINTENANCE MANUAL

rev 2.0

1 GENERAL INDEX

2 CERTIFICATION

The manufacture, *ELBO CONTROLLI i.e.*, under its own responsibility

DECLARES THAT:

The KHYAN presetters conforms to safety standards where enforceable.

- 2006/42/CE

  harmonized standards EN ISO 12100-1, EN ISO 12100-2

- 2004/108/CE

  harmonized standards EN61326-1, EN55011 ISM (group 1, class A),

  EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4,

  EN61000-4-5, EN61000-4-6, EN61000-4-11

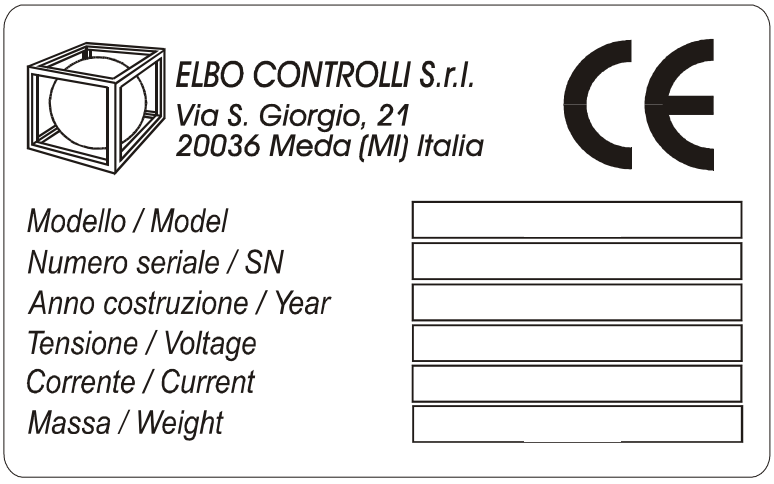
- 2006/95/CE

  harmonized standards EN60950-1, EN60204-1

as shown in the test reports enclosed to our technical brochure

MEDA, 03/10/2008

Massimiliano Tasca
General Manager



The relevant information for each specific machine is summarized on the identification plate (illustrated above) displayed on the left side of the presetter.

3 DISMANTLING

Information obligations to the users

DISPOSAL OF WASTE MATERIALS

INFORMATION FOR PROFESSIONAL USERS
- VALID IN EUROPEAN COMMUNITY ONLY -

According to the 2002/95/CE, 2002/96/CE and 2003/108/CE Directives, relative to reduction in the use of hazardous substances in electrical and electronic apparatus, as well as to disposal of waste materials.

The symbol of a crossed box applied on the apparatus indicates that at the end of its useful life the product must be collected separately from other waste materials.

The seprate waste collection of the apparatus which has reached the end of its useful life is organized and managed by the national dealer.

The user who disires to get rid of the present apparatus must therefore contact the national dealer and follow the given instructions.

Suitable separate waste collection for then sending the cast-off apparatus for recycling, treatment and environmentally friendly disposal, contributes towards preventing any possible negative effects on the environment and on health and encourages the reuse and recycling of the materials the apparatus is made up of.

Unauthorised disposal of the product by the user will lead to payment of the administrative sanctions in force in the country where it is put on the market.

4 PRESENTATION

First we would like to take this opportunity to thank you for your purchase of *Elbo Controlli's KHYAN Presetter*. You will certainly have great satisfaction using the *ELBO CONTROLLI KHYAN Tool presetter* and you'll increase the profitability of your NC machines.
KHYAN presetters have been manufactured in compliance with ergonomics and simplicity principles, and offer outstanding technological solutions. The mechanical systems, electronics and software deal with tool measurement and pre-adjustment. The 106V camera vision system, designed by ELBO CONTROLLI, is used to collect measurement data both automatically and manually.

The good value for money and the precision of measurements make KHYAN one of a kind.

4.1 Features

– Measuring range: diameter max 400 mm (radius 200 mm); height max 500 mm.

– Machine structure is stainless-steel offering high mechanical strength and long life, floor mounted with auto-leveling supports in non-deformable steel.

– Base and column made of ground natural granite: linearity max error 2 µm/Mt certification with Taylor Hobson ris.1 µm/Mt electronic millesimal level.

– ISO / BT / HSK / CAPTO / VDI / etc. Interchangeable rotating spindle-holder (to be specified) max run-out error < 2 µm.

– Double vault arc prismatic slideways: N° 2 X axis slideways; N° 1 Z axis slideways.

– Double re-circulating ball bearing slides, lubricated for life (3) (preloaded slides/slideways: P/H class).

– Universal mechanical tool clamping managed via software.

– Control via software with sensor of empty for the exact position between the tool-holder axis and the machine spindle axis, no error of concentricity.

– Pneumatic-mechanical braking of the spindle-holder rotation with radial compensation of the clamping force: no axis angular run error.

– Constant load Archimedean spiral spring (as opposed to a mass counter-balance system).

4.2 Technical Features

– Double monitor to display the images and to manage the measurement functions:
- Tool measurement and cutting-edge inspection:

- 10.4", color TFT screen, 13X and 26X magnification (zoom) LVDS (on column support).

- C-MOS sensor 1,3 Mega pixels, USB connection, 2 High speed area, 12.8 x 10 mm framed image (4 times bigger than standard values).

- Measurement management and machine Operator interface:

- SXGA TFT 17” color LCD monitor (on machine base adjustable support), 13X/26X magnification (full screen).
- Celeron M® processor on Industrial Main Board architecture.
- LINUX operating system.
- Keyboard and mouse.
- X and Z axes block management with control maximum speed of translation 2mm/sec.

– Standard software:

- Tool set and universal Post Processor generator.
- CNC machine origin management and adapters.
- Creation of tool lists and/or individual tool, even with multiple cutting-edges.
- Automatic change of CNC machine origin allocation.
- Magnetic chip code-holder (Balluff for example, hardware not included).
- Tool image shooting during the inspection and relevant storage in graphic format.

– Optical Equipment:

- Telecentric lens.
- Doublet lenses at low F/Number in order to eliminate the error of the clearness circle.
- Episcopic illuminator with ring lens and red LEDs; diascopic illuminator with red, puntiform light LED.

– ELBO CONTROLLI Linear Transducers in optical glass type SLIDE 371 certified HP laser:

Axis resolution: X= 1 μm, Z= 1 μm

5 WARNINGS

5.1 Introduction

This operation and maintenance manual, concerning the KHYAN Tool presetter should be considered as an integral part of the apparatus and therefore it should be kept with care for future references.
All the procedures and information contained in the manual cannot be a substitute for the end user's adequate tool presetting experience, but they provide the necessary information for the correct and proper use of the KHYAN tool presetter.

Unauthorized equipment handling, non-compliance of instructions, or improper or incorrect use may lead to unforeseen results for which *ELBO CONTROLLI S.r.l.* declines all civil or criminal liability.

ELBO CONTROLLI S.r.l. reserves the right to modify at any time the tool presetter and the operator's manual without prior notification on account of the continuous technical updating of the product in pursuit of the Company strategy aimed at perfecting presetting technology of tools measurement and presetting and at customer satisfaction.

All suggestions for improvements of the apparatus or manual are welcome either by fax or letter to our head office.

5.2 Purpose

The aim of the manual is to allow the KHYAN Tool Presetters operator to become acquainted with the machine operating directions, routine and non-routine maintenance and the proper operating procedures and to show all the required necessary actions from the presetter's introduction until disposal.
Implement only the allowed use and the configuration reported, approved by *ELBO CONTROLLI S.r.l.*; any other use or configuration is not recommended, as it may compromise the tool's proper functioning and/or its safety. This manual does not replace the experience and the technical expertise of the personnel involved in the use of the Presetter machine and is to be considered as a guide at all times.

This manual must be read following the chapters in their logical order, because the repeated information is explained in full the first time it appears, afterwards it is only mentioned because it constitutes knowledge already acquired.

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5.3 Font Characters and Heading Layout

This manual is sub-divided into chapters which contain homogeneous information, each chapter is identified by a title in the following font character:

X. FIRST CHAPTER

Each chapter is identified by a title in the following text format:

X.X First Paragraph

The operation or maintenance procedures are identified by:

☒ *Procedure*

Then the characters will identify the procedures:

- step 1
- step 2

  .....
- step 4

Notes or instructions are identified using the following format:
☑ Note or instruction of particular interest.

5.4 Active Software Version

The software starts after this screen, which displays the details about the installed version.

Figure 1: Splash

6 PREPARATION AND INSTALLATION

6.1 Packing List

Before proceeding with preparation and installation, check that the tool presetter packaging contains the following components:

presetterMOD.

☐ KHYAN

ROTATING SPINDLE

☐ ISO 30 ☐ ISO 40 ☐ ISO 45 ☐ ISO 50
☐ HSK 63 ☐ …… ☐ …… ☐ ……

RESETTING GAUGES

☐ ISO 30 ☐ ISO 40 ☐ ISO 45 ☐ ISO 50
☐ HSK 63 ☐ …… ☐ …… ☐ ……

REDUCERS

☐ ISO ..... VDI ……..... ☐ altro .....…….....

MINI-LABELLING MACHINE ☐ ……....…….. **LABELS** ☐ ……...……...

FEEDER

OPERATION MANUAL

TEST REPORT

WARRANTY

DUST COVER

Checked by.....

6.2 Safety Norms

The personnel involved with the KHYAN Tool Presetter are not required to use any particular protection, however they must be informed of the following potential dangers:

- In particular conditions of measurement of the vertical axis, the 106V illuminator can be at a height, which can be head butted in case the machine is used without the necessary attention.
- We recommend carrying out the manipulation of tools carefully and, if necessary, protecting one's hands because tools are sharp and may be dangerous..

☑ The person responsible for employee safety should train the people required to use the tool presetter, by imposing the reading of this manual.

6.3 Suggested use of the Machine

The KHYAN Tool Presetters is an instrument to preset and measure the tools surveying their dimensions along the X and Z axes, in accordance with the axis definition of the machine using the above-mentioned tools. The measurable tools are to be compatible with the presetter spindle; any attempt to adapt the tool presetter spindle taper without using the appropriate adapters supplied by *ELBO CONTROLLI S.r.l.* is to be considered improper use.
The maximum weight of the tool to be measured should be no more then 40 kg.
Any other use is to be considered improper and compromising the operator's safety.

☑ *The KHYAN Tool Presetter is to be handled by a single person in conditions of tested and controlled efficiency, in respect of all procedures described in this manual.*

6.4 Packing Transport and Storage

The instrument must be handled inside its proper case, which prevents from normal mechanical stresses. Stated outside the packaging are the shipping instructions, particularly the specified total weight, transport position and using symbols, vulnerability to atmospheric agents and the need to handle with care.
Keep the original packing and use it for future transportation of the instrument.
Tool presetter transportation is to be carried out by qualified carriers able to grant the correct handling of the transported goods, observing the following precautions:

- Lift only with fork lift or pallet jacks.
- Do not bump, throw, drop, roll, or drag the case.
- Do not overcharge the packing by piling more than three cases.
- Avoid exposure to atmospheric agents.
- Maintain the prescribed transportation position.

The storage environment must fall within the following environmental conditions:

- Safe from the atmospheric agents
- Temperature between -10 and 50 °C
- Relative humidity between 20% and 95% without condensation.

6.5 Installation

After the machine has been transferred to the installation site, the unpacking procedure shall be followed with reference to the attached sheet. As for re-packing, the reverse procedure should be followed.

☒ *Unpacking procedure*

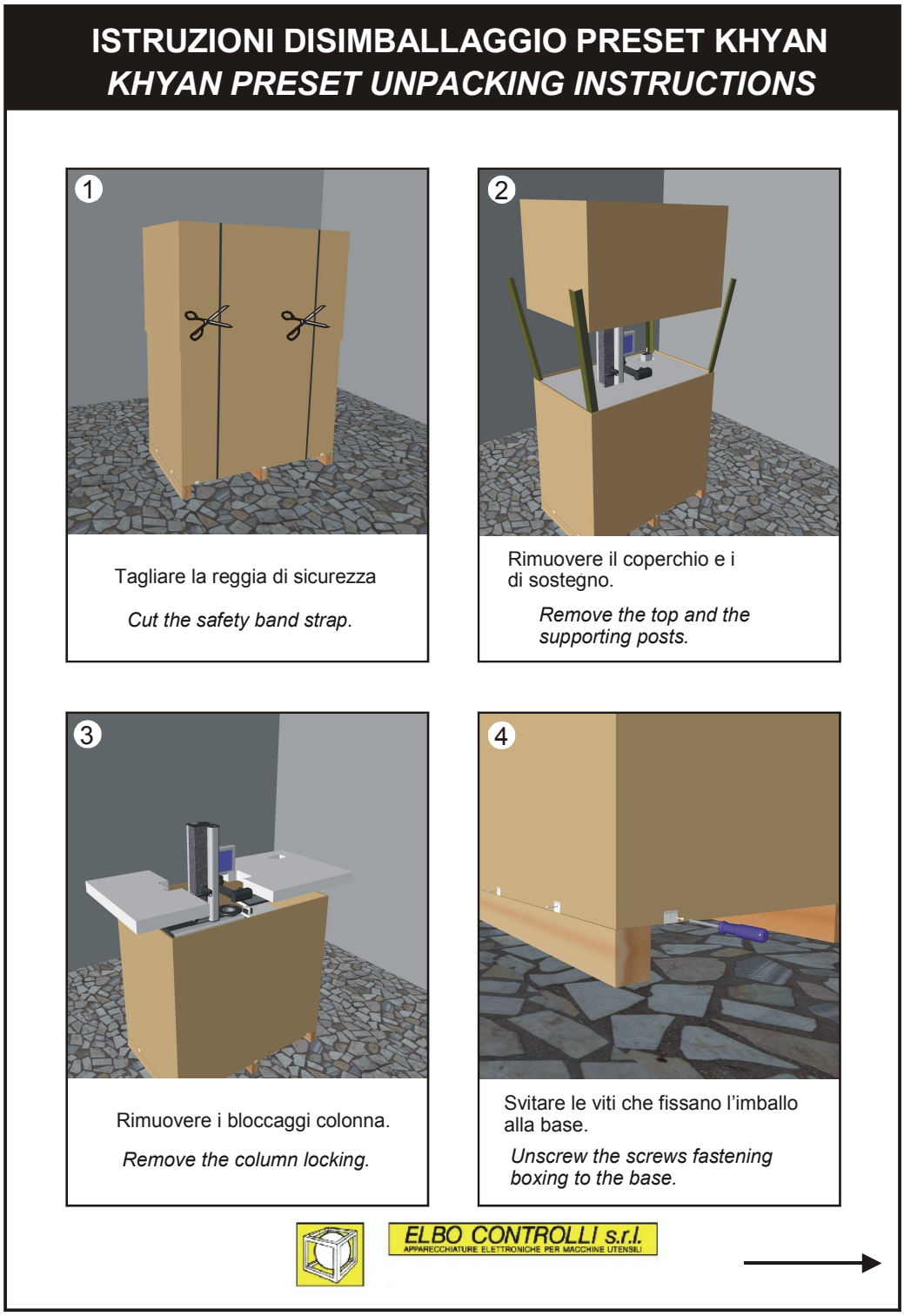
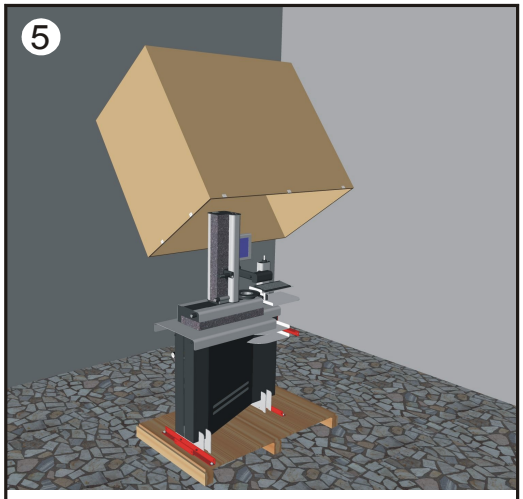


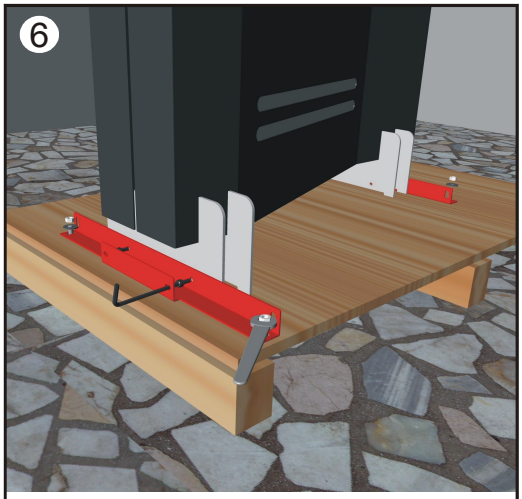
Figure 2: Unpacking instrucions

ISTRUZIONI DISIMBALLAGGIO PRESET KHYAN
KHYAN PRESET UNPACKING INSTRUCTIONS



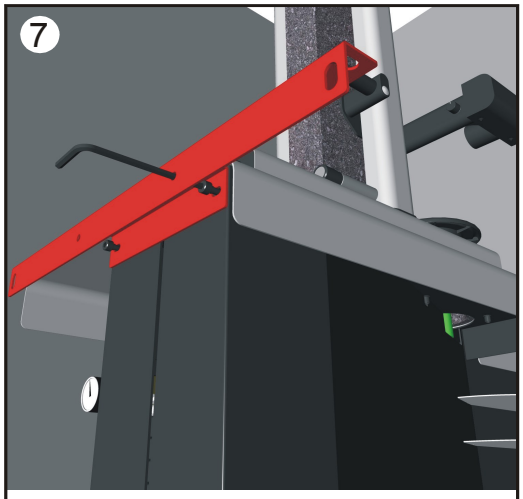
Togliere l'imballo sfilandolo verso l'alto.

Take the boxing off.



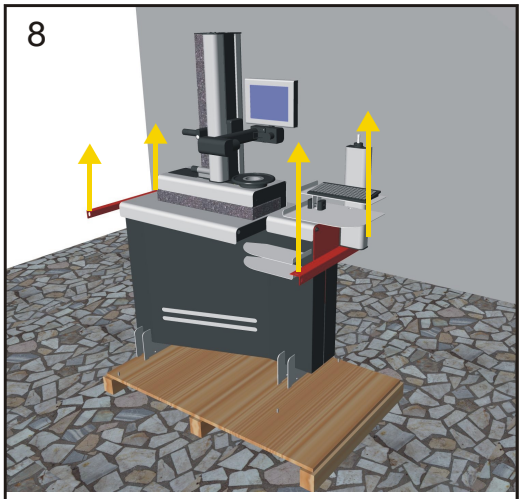
Svitare le viti che fissano le staffe di trasporto al pallet e alla macchina.

Unscrew the screws fastening the transport brackets to the machine.



Fissare la staffa di trasporto alla parte superiore della base macchina.

Fix the transport bracket to the upper side of the machine base.



Sollevare la macchina attaccandosi agli appositi punti indicati dalle frecce.

Lift the machine, by the suitable points indicated by the arrows.

ELBO CONTROLLI s.r.l.
APPARECCHIATURE ELETTRONICHE PER MACCHINE UTENSILI

Figure 3: Unpacking instructions 2

☒ *LCD screen assembling procedure*

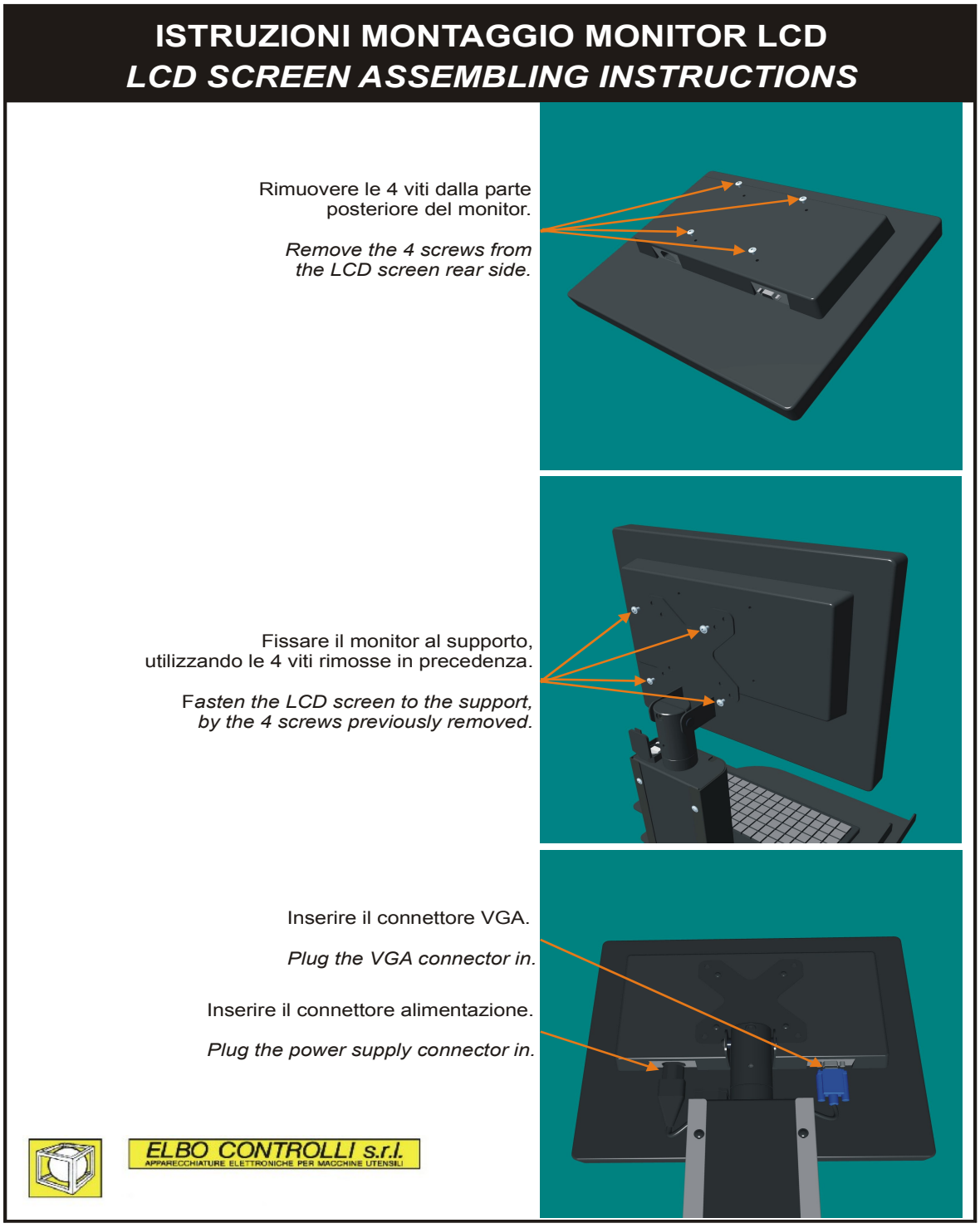


Figure 4: LCD assembling instructions

If the PC monitor is not in a desired position, you must loosen the clutches of the tilting axes; to carry out this operation, act as follows:
If the vertical oscillation (Fig. 1) is not in the correct position, slightly loosen the A set-screw in Fig. 1 (use a 5mm Allen key); if the vertical oscillation is too tight, slightly loosen the A set-screw in Fig. 1.

If the horizontal oscillation (Fig. 2) is too loose, slightly tighten the B set-screw in Fig. 2 (use a 3mm Allen key); if the horizontal oscillation is too tight, slightly loosen the B screw in Fig. 2.

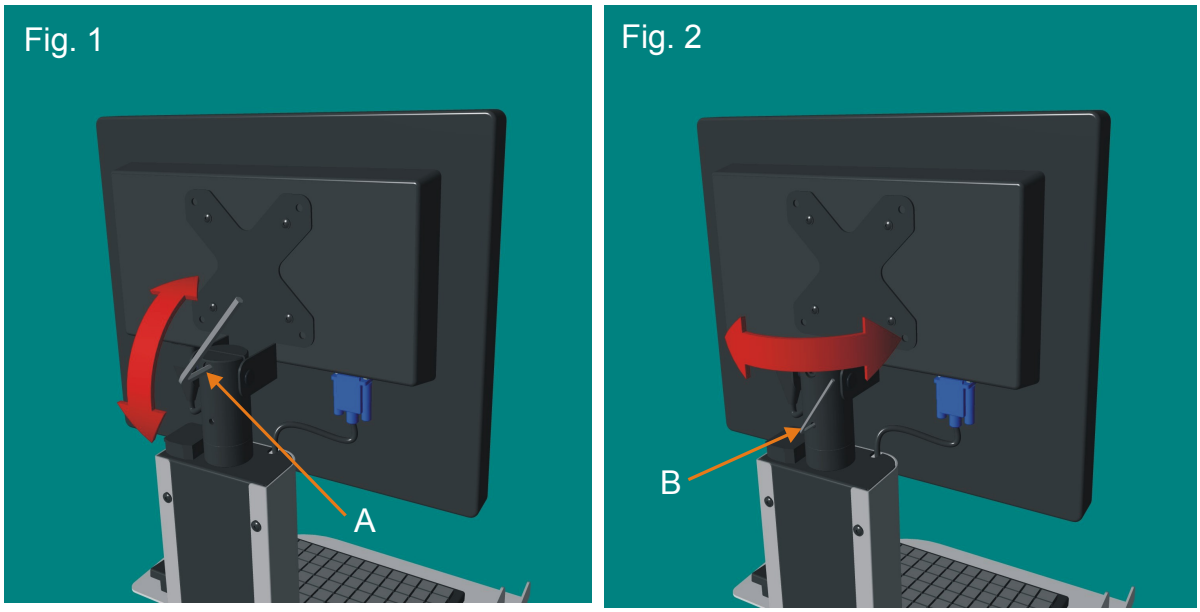
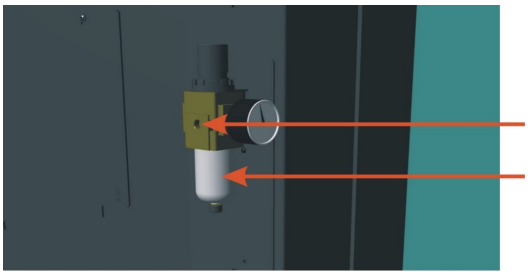


Figure 5: Monitor orientation

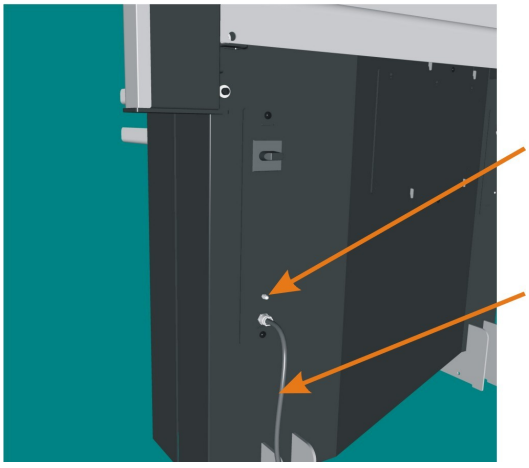
Machine stabilisation
The machine should be installed on a flat and level surface (± 1.5 cm / mt); in case of instability, it will be necessary to operate on support feet. Presetter shall be located in an area free of vibrations that might have effects on the machine stability.



Machine pneumatic connection

Connect the presetter to the compressed air system and set the feed pressure between 5 and 6 bar.

Compressed air impurities collection vessel



Machine electrical connection
Connect the presetter to the earthed system by making use of a yellow/green conductor minimum section 1.5 sq mm, fixed on the provided terminal.
Connect the presetter to the electricity transmission grid by inserting the plug into the 115-230 Vac mains socket.

6.5.1 Front View

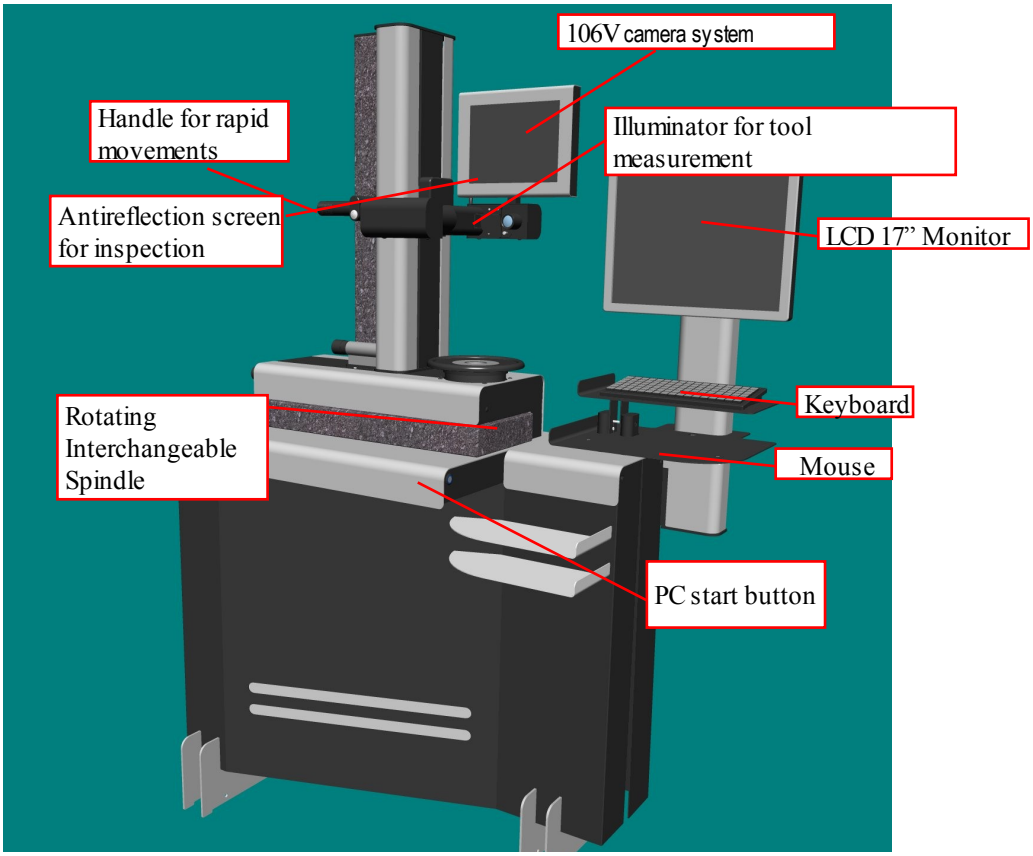
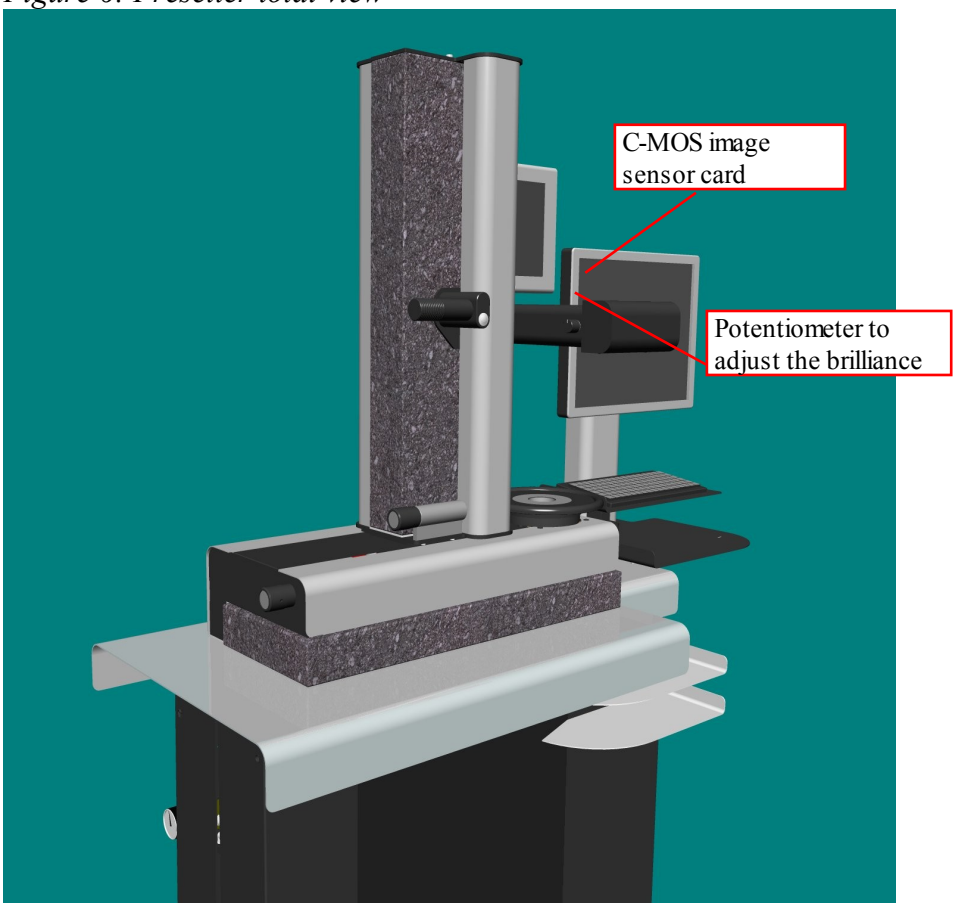


Figure 6: Presetter total view



6.5.2 Rear View

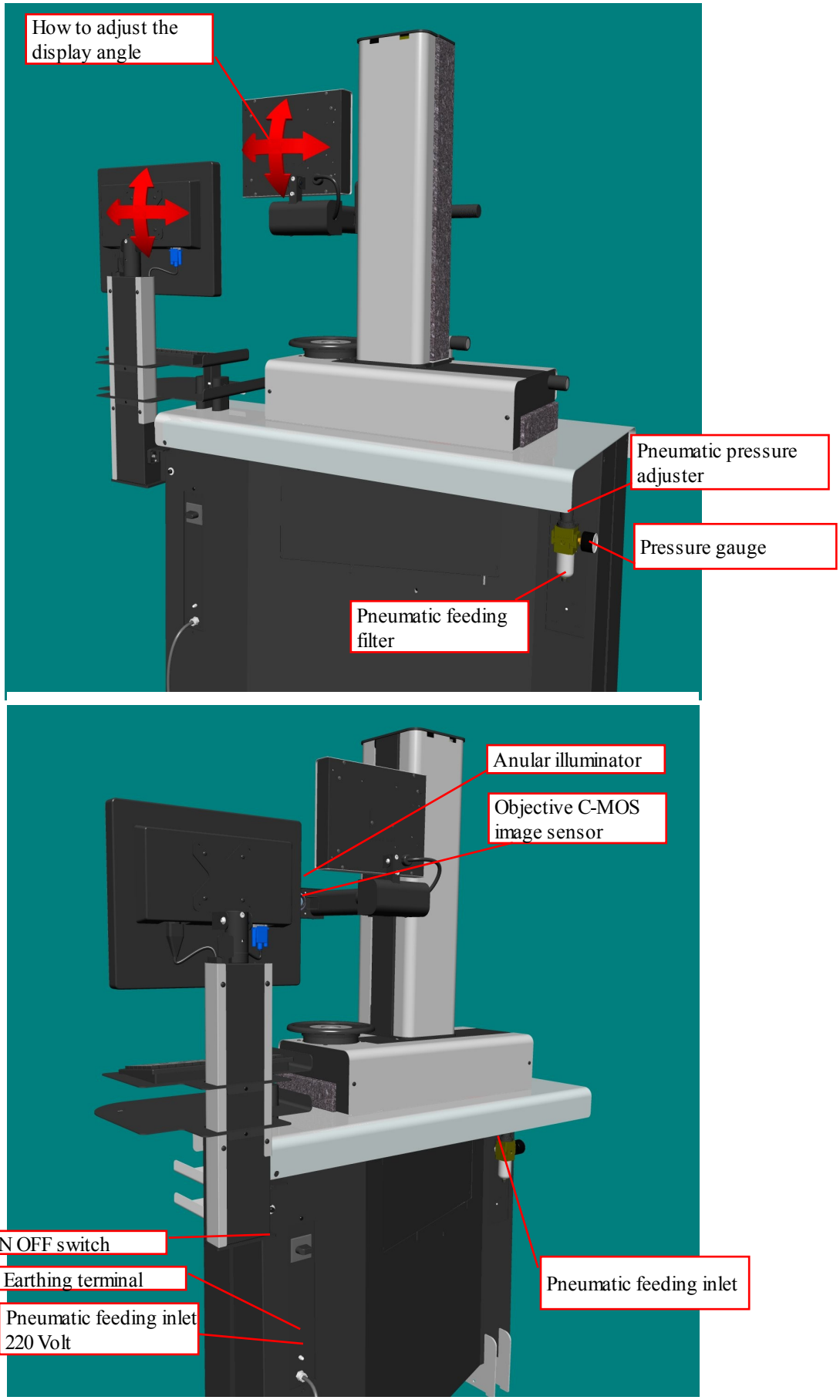


Figure 7: Presetter total view 2

6.6 Operating Conditions

As the presetter is a precision instrument, it shall be positioned in a trouble free site (free from dusts and/or air corrosive substances, excessive vibrations, violent ranges of temperature), safe from sunrays direct illumination and far from windows and skylights. It shall be positioned preferably in rooms with diffused artificial lighting and a space for working facilitating measurement takings.
The instrument does not generate acoustic emissions, apart from the sound of the pneumatic solenoid valves exhaust, when they are activated by the key panel, lower than the limit of 70 dB A.

The recommended climatic conditions are as follows:

- Temperature between 10 and 40 °C.

- Safe from the atmospheric agents.

Relative humidity between 20% and 95% without condensation.
☑ The best performance is obtained in an environment with a constant temperature.

6.7 Poewr Supplies

Electrical circuit: The Presetter is fed by 115/230V AC, 50/60Hz, 200W.
Pneumatic circuit: The Presetter requires compressed air at a pressure included between 5 and 6 bar.

7 DESCRIPTION OF MAIN CONTROLLS

7.1 Initial Screen

Once the system has been completely started, you can display the following screens on the 17” LCD monitor and the 10.4” TFT vision system:

Figure 8: Main screen

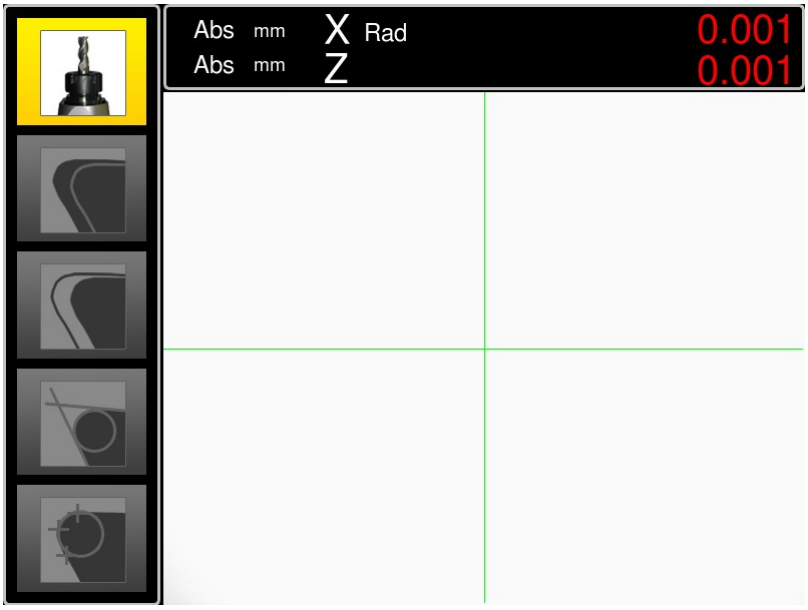


Figure 9: Secondary screen

Key colors specify the condition of a function in a specific moment and comply with the following principles:

The key is completely grey

The function is not enabled

The key has a light blue edge with central grey icon

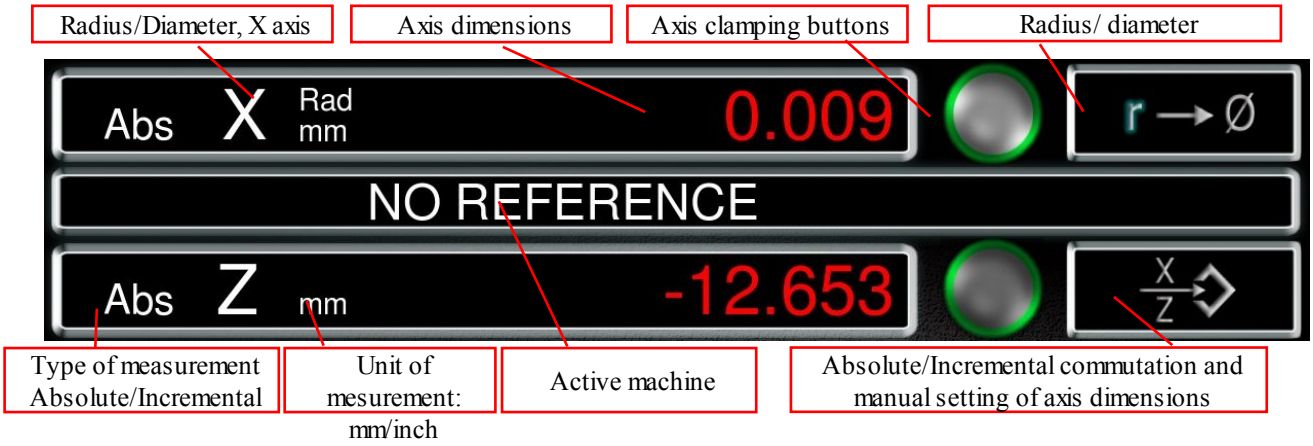
The function is enabled, but it is not active

The key has a light blue edge with central light-blue icon

The function is enabled and active

Now you are going to deal with the areas that can be identified within the main screen and examine the relevant functionality.

7.2 Information Area



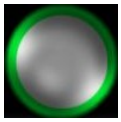
The upper area of the screen displays all pieces of information concerning the measurement you are performing and allows modifying the measurement mode. In detail, you will know:

- If the dimension that is displayed for each individual axis is ABSOLUTE (Abs), and so referring to a specific origin, or INCREMENTAL (Incr) and therefore referring to a zero selected by you as a reference (the procedures for absolute/incremental commutation and the manual setting of axes dimensions will be dealt with below).
- If the dimension that is displayed for the X axis refers to the RADIUS or the DIAMETER of the tool that you are measuring. This mode can be set as default value at the start, and can change every time you select a machine origin (it takes the value that is defined in the same origin, see chapter 10) or by pressing the radius/diameter commutation key (the procedure for radius/diameter commutation will be dealt with below).
- If the active unit of measurement is MILLIMETRES (mm) or INCHES (Inch); this mode can be set as the default value at the start, as well, and can change every time you select a machine origin (it takes the value that is defined in the same origin, see chapter 10).

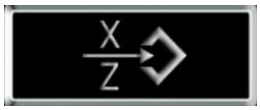
– When the axis is in ABSOLUTE mode, the dimensions will refer to the following origin:
  - NO REFERENCE means that you have not acquired axis zeroes yet (paragraph 8.1) and the displayed dimension is completely random (dimension displayed in RED color).
  - NO MACHINE means that axis zeroes have been acquired, but no machine origin has been selected (chapter 10); therefore, the dimensions are the distance between the axis zero and the point in which the axis is positioned (dimension displayed in YELLOW color).
  - the name of the origin selected by you means that the displayed dimension relates to the origin, and therefore the tools to be measured will have an exactly equivalent value after the installation in the machine (dimension displayed in WHITE color).

The dimension displayed will be in YELLOW color also during a measurement in incremental mode, while there will be a dimension displayed in GREEN color when measuring in auto-targeting mode with an active machine origin; it means that the displayed dimension is the real measurement of the tool in any point of the display where it is shown (obviously, on condition that it is in the correct focusing position).

– If the quick translation of the axes has been disabled by means of the axis clamp buttons, which allow inhibiting the quick translation of one or both of the axes in a specific position and disable the relevant pneumatic unclamp, but obviously with the opportunity to move them by means of a micrometric translation.

 Unclamped axis  Clamped axis

☒ *Absolute/incremental commutation procedure*



If you press the absolute/incremental commutation key, the following screen will be displayed.

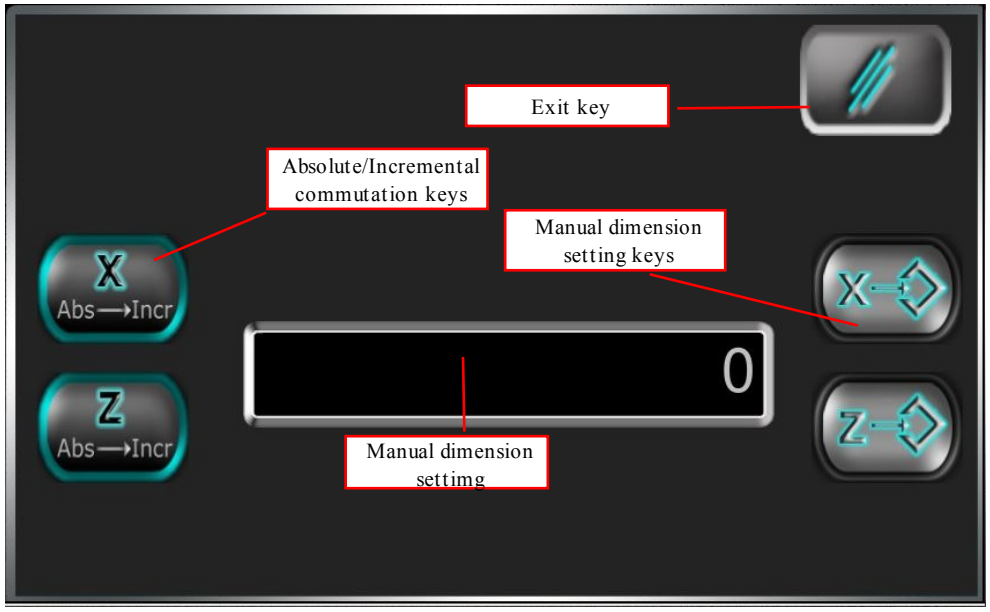
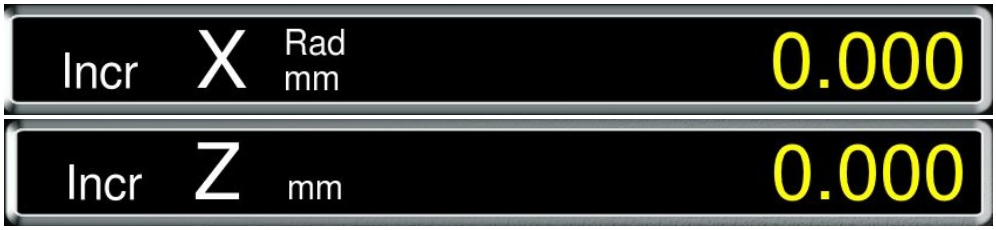


Figure 10: Axes set up window

By pressing one of the aforesaid keys, you will incrementally commute the selected axis, and the graphic display of the same axis will be set to zero in the point in which it is: it will be the new reference for the measurements to be carried out after that.
The graphic display shows yellow-colored dimensions.

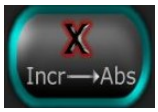


If you press each commutation key once more, you will set the measurement back to the absolute mode and the graphic display will show the dimension of the axis relating to the active machine origin (graphic displayed in white color) once more or, if there are no active origins, to the zero point that is the reference for the optical scale (machine zero value – graphic display in yellow color).

☒ *Procedure for setting X and Z axis dimensions*

It is also possible to set a dimension according to choice on each of the two axes by using the relevant key and writing it in the "manual dimension setting" field.

The dimension is always considered as incremental(graphic displayed in yellow color and Incr indicator).



If you press the Incr→Abs key, as in the previous procedure, the dimension will be set back to the absolute value.

X axis radius/diameter commutation procedure

As already said, the default mode will depend on machine SETUP settings or the active machine origin. You can manually commute the display at any time, therefore if you are in radius mode,

press the radius/diameter key to display the X axis in diameter and, vice versa, if you are in the diameter mode

press the radius/diameter key to display the X axis in radius.

7.3 Software Operation Keys

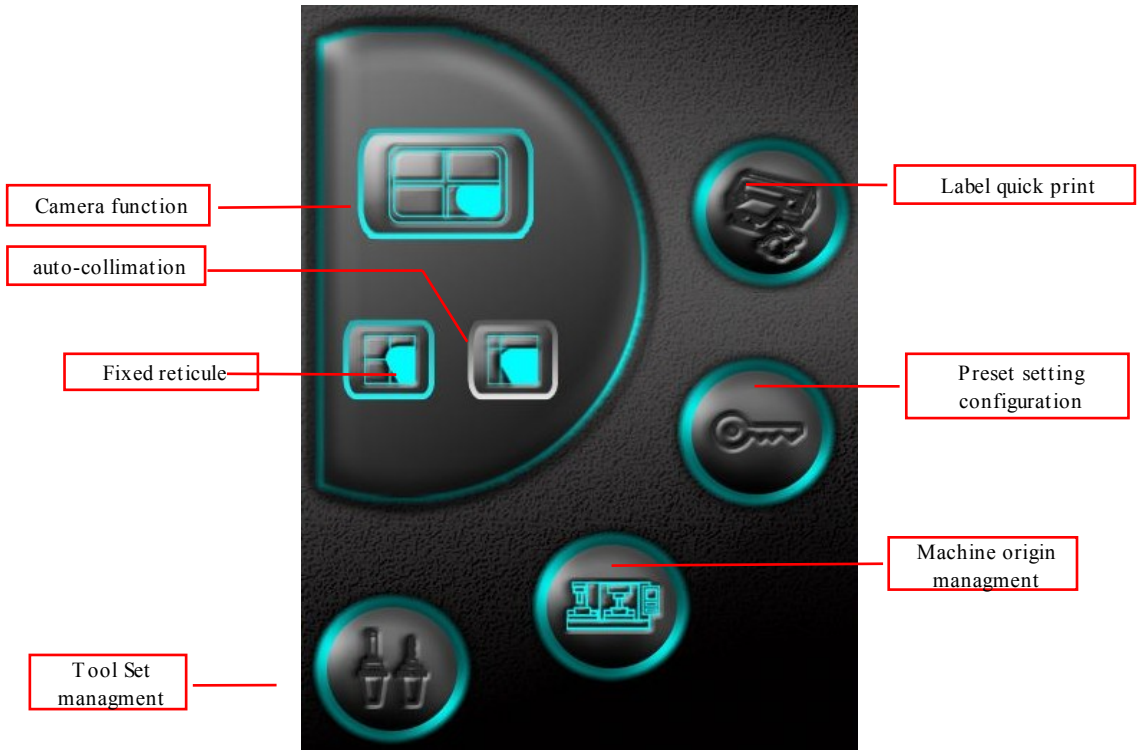


Figure 11: Main functions keys

The lower right area of the display relates to the operating modes of the software and allows:

- accessing the **camera functions** by selecting to perform the measurement with the fixed reticule or in auto-targeting
- obtaining the **quick print of a label** with the information about the tool that is being measured (values in X and Z, insert radius, angles and notes by the operator)
- accessing the **presetter configuration** page to select the language, the default settings, the active options, etc.
- accessing the area to enter and modify the **machine origins** in which you can configure the settings of all machine tools that the presetter will serve
- accessing the area to enter and modify the **tool set** and, after that, all tools that form them.

7.4 Spindle Functions

In case of the avalaibility of different spindles, please follow these instructions for the substitution.

☒ *Procedure for the rotating spindle substitution*

- Move the column in a position to facilitate the spindle disassembly operation:
  X axis completely to the left; Z axis completely to the top.
- Remove the tool from the spindle and disactivate the brake and the index.
- Remove the rotating spindle from above keeping it parallel to the column.
- Clean the extracted spindle and lubricate the rectified parts with anti-oxidizing liquid (i.e. Chesterton 775), before placing it in an appropriate place.
- Clean the replaced spindle.
- Insert the new spindle into the spindle body of the presetter, keeping it parallel to the column.
- In case you dispose of adapters only and different rotating spindles are not available, follow next procedure.

☒ *Procedure for the spindle adapters substitution*

- Remove, if present, another adapter, clean and lubricate the ground parts with anti-oxidizing liquid (i.e. Chesterton 775), and lay it in a safe place;
- Clean the spinlde and the new adapter.
- Insert the adapter into the spindle.

I

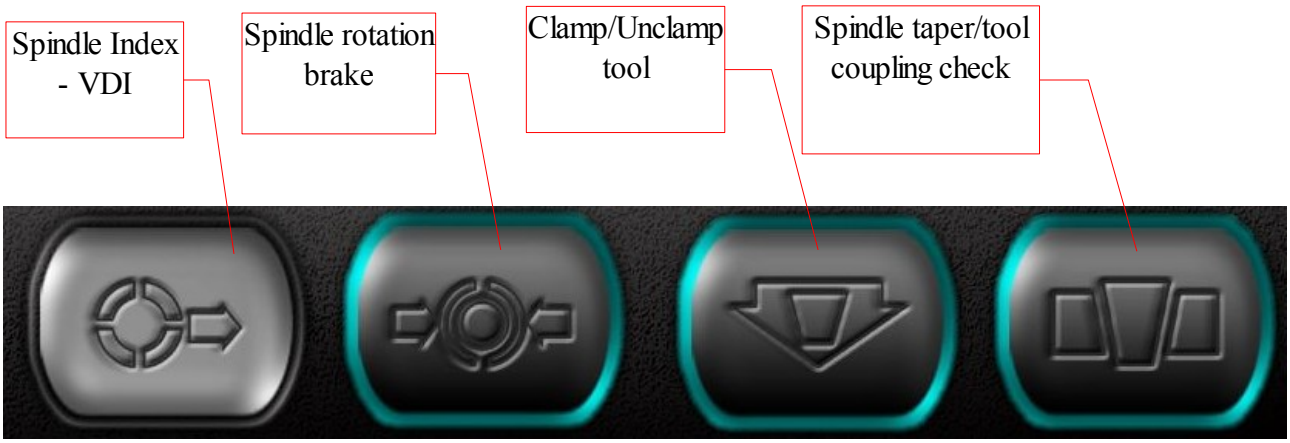


Figure 12: Machine functions keys

The keys that are to be found in the lower part of the screen are used to activate the functions that are connected to the preset mechanism and, as previously described, the color specifies the relevant operating condition.

– The **spindle index** function is provided for only in the machines that are equipped with standard VDI spindle holders and is enabled when the active origin relates to a machine that is configured as a lathe (see chapter 10 – MACHINE ORIGINS): it allows for mechanically orientating and clamping the spindle in four positions, one every 90°.

– The machine is equipped with a manual pneumatic-mechanical brake for the rotation of the spindle holder with radial compensation of the clamping force: the **spindle rotation brake** function allows stopping the rotation of the spindle in the desired position, for example after having found the maximum focusing point for the tool.

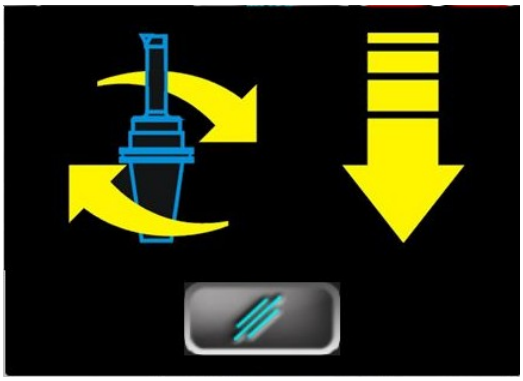
– The **clamp/unclamp tool** function, in order to achieve a higher accuracy level during the measurement of the tool, starts the guided procedure that allows mechanically clamping/unclamping the tool inside the spindle taper (the tool clamp/unclamp procedure will be dealt with below).

– The **tool/spindle taper contact check** function allows, by means of a vacuum sensor, checking the surface contact between the tool holder and the machine revolving spindle, thus eliminating possible concentricity errors (the tool/spindle taper coupling check procedure will be dealt with below).

☒ *Tool clamp/unclamp procedure*

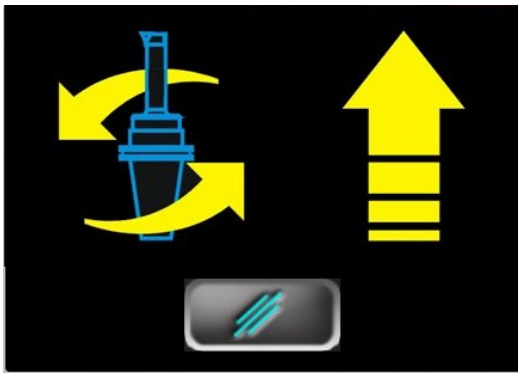
- Rotate the spindle holder in counter clockwise direction until reaching the end of the stroke

- Introduce the tool and press the key to perform the clamp: the following screen will be displayed and it will ask you to rotate the spindle holder in clockwise direction.



- After a few revolutions, you will notice a resistance in the rotation and after that a click; after the click, the rotation of the spindle holder will be free again and a screen will be displayed to specify that the clamp was performed in a correct way.

- To remove the tool, press the unclamp key once more, and then rotate the spindle holder in counter clockwise direction until completely releasing the same tool, as specified in the picture that is shown in the display.

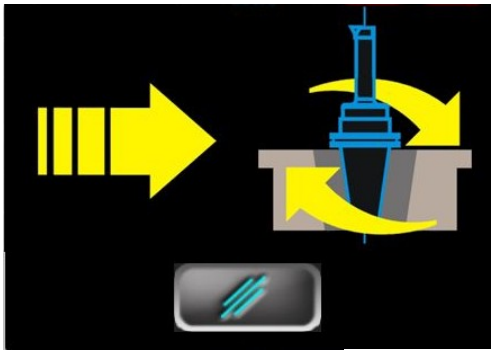


☑ The above-mentioned procedure allows improving the contact between the tool and the spindle holder, thus achieving a higher accuracy level during the measurement.

If you do not want to use the tool mechanical clamp, rotate the spindle holder in clockwise direction without pressing the clamp button, until you hear a click after which the rotation will become free once more: introduce the tool and start the measurement.

☒ *Tool/spindle taper coupling check procedure*

- After having introduced the tool into the spindle holder and, if you like, after having performed the clamping procedure, press the check key and slowly rotate the spindle holder until you find the precise position where the air suction hole coincides with the spindle hole.



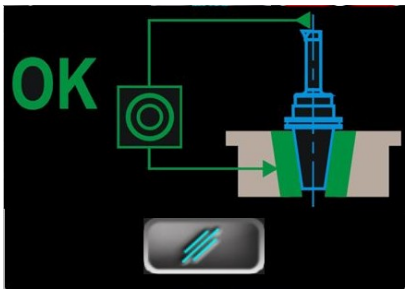


Figure 13: Positive vacum test

- After having reached this position, the software will specify if the contact is correct or if dirt or defects in the taper prevent it from being correctly positioned.

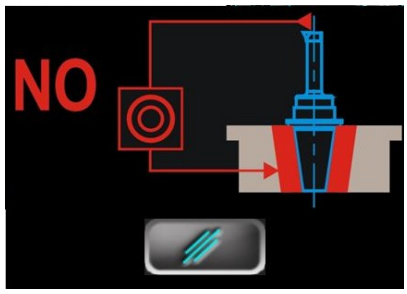


Figure 14: Failed vacum test

- In this case, it will be necessary to remove the detected defects and repeat the test until achieving a complete concentricity between the tool and the spindle holder. After having completed these operations, press the exit key and start the measurement.

7.5 Axes Movement

Axis movements are manual and have two modes, rapid and micrometric. The rapid movement is used to frame the tool in the 106V of view and to move away at the end of the measurement. The micrometric movement is used for the collimation of the tool's profile and the measurement acquisition.

7.5.1 Rapid Movement

To move the axis according to the rapid movement, grip the handle and press the release key (see picture), then move the handle to the desired position (X and Z). The rapid movement is possible as far as the key is pressed; thus, at its release the axis will clamp again.

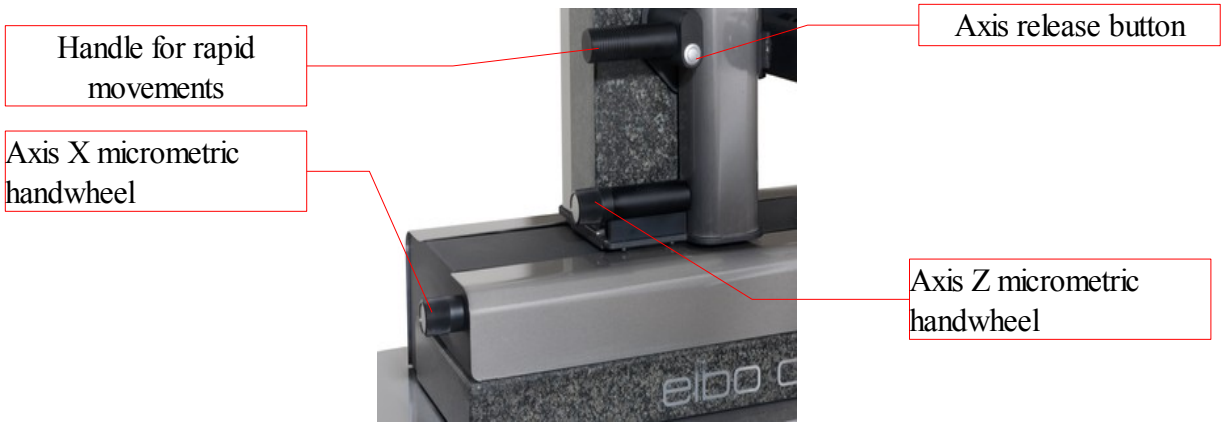


Figure 15: Axes control

Move the axes simultaneously to reach the tool measurement area more rapidly, as the axis clamping/release function enables moving only one while the other is kept still.

Figure 16: Axes clamping button

☑ Avoid hitting the limit stops at the end of the stroke not to damage the presetter.

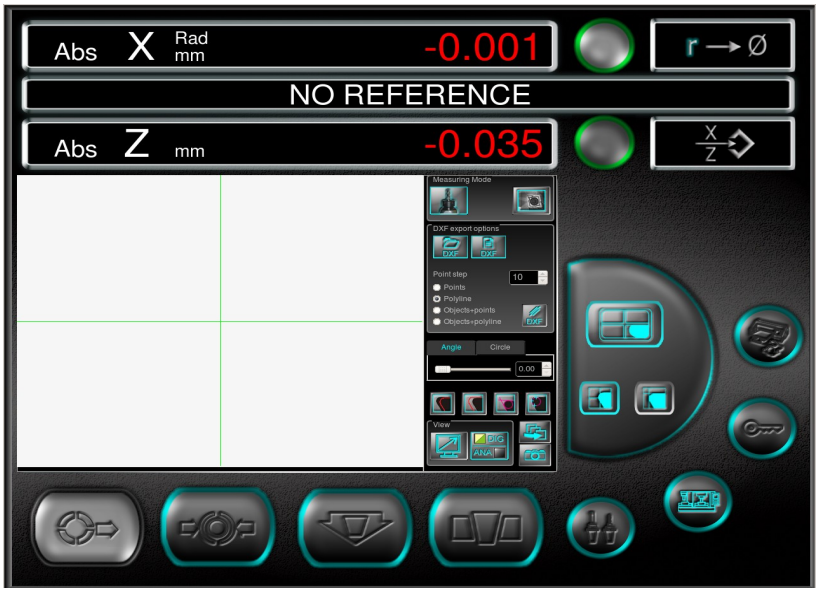
7.5.2 Micrometrical Adjustment

After framing the tool profile with the rapid movement, the collimation of the measurement points is possible using the two handwheels (axis X and Z).
The micrometric movements always function when the axes are clamped, that is when the release button is released.

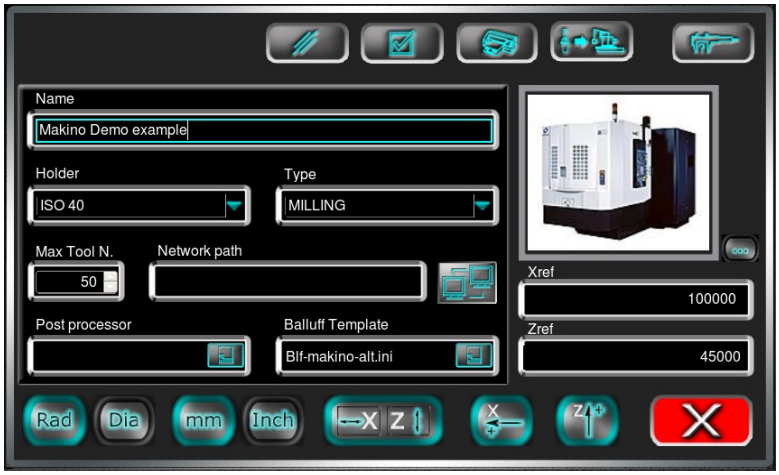
The handwheel rotation determines a traverse of the axis concerned by 1.25 mm per revolution.

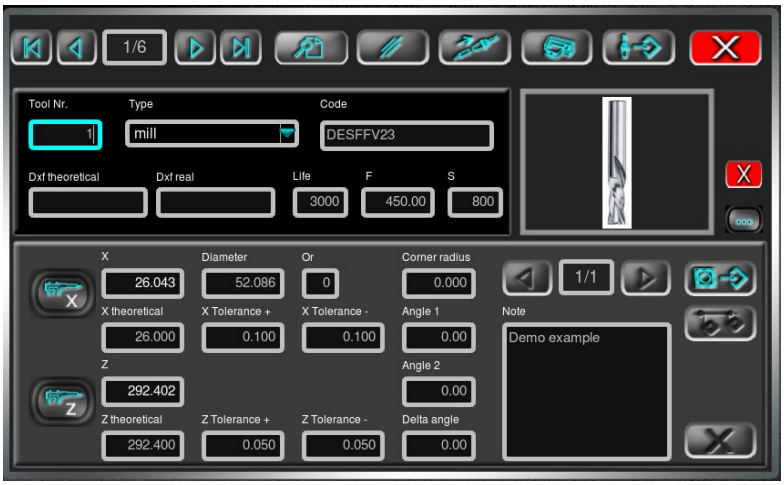
7.6 Operating Area of the Software

In this area you will perform all operations concerning the camera (measurement, inspection, geometric calculations, etc.), all insertions/updates concerning tool set and machine origin tables, prints, presetter configuration and any other item that will be described in detail in the following chapters.



For example, the following screens show the functions concerning the camera, the configuration of machine origins and a tool set.


Name
Makino Demo example
Holder
ISO 40
Type
MILLING
Max Tool N.
50
Network path
Post processor
Balluff Template
Blf-makino-alt.ini
Xref
100000
Zref
45000
Rad
Dia
mm
Inch


1/6
Tool Nr.
1
Type
mill
Code
DESFFV23
Dxf theoretical
Dxf real
Life
3000
F
450.00
S
800
X
26.043
Diameter
52.086
Or
0
Corner radius
0.000
X theoretical
26.000
X Tolerance +
0.100
X Tolerance -
0.100
Angle 1
0.00
Z
292.402
Angle 2
0.00
Z theoretical
292.400
Z Tolerance +
0.050
Z Tolerance -
0.050
Delta angle
0.00
1/1
Note
Demo example

8 PRELIMINARY OPERATIONS

8.1 Zero Setting of the Axes

As previously described, the red color of axes dimensions and the wording NO REFERENCE, which are displayed after the start, at this point the machine cannot refer to any objective origin, thus it cannot provide for any type of significant measurement.

☑ *The only possible measurement in this condition is to commute the axes into incremental, thus providing for a subjective reference, which will be always lost when the axis passes on the reference zero point for the optical scale.*

The attempt to access any operating function will be preceded by the following screen:

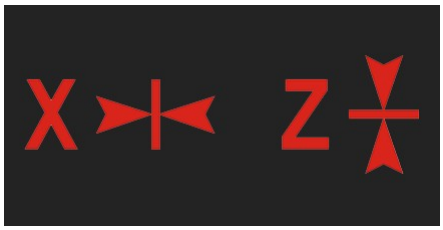


Figure 17: Machine's zero not reached

the first operation to be carried out is to translate the two axes along their stroke until travelling from the reference zero point for the optical scale and display the relevant yellow-colored dimension.

Figure 18: Axes display

Now the machine has the first repetitive and objective reference, which concerns the reference zero point to be found in the measurement system.
The yellow-colored dimensions exactly display the distance between the zero value of the optical scale and the point where the axis is in that moment.
From now on, the presetter can accept and recognize machine origins, and therefore all functions are available.
The operation for zero setting the axes must be repeated only if the Khyan presetter is turned off.

8.2 Presetter Configuration

8.2.1 Introduction

The section that concerns the presetter configuration is correctly set during the testing, which is performed during the manufacturing process; however, there are some parameters that can be customised by the final user according to the specific needs.
Below you can find the detailed description of the content of this area and where the user can perform the modifications, if any.

.

8.2.2 Parameters Description

☒ *Presetter configuration procedure*

If you press the access key and enter the required password (default value: **elbo**), you will enter the configuration screen that is described below and, during this operation, all other machine functions will be disabled.

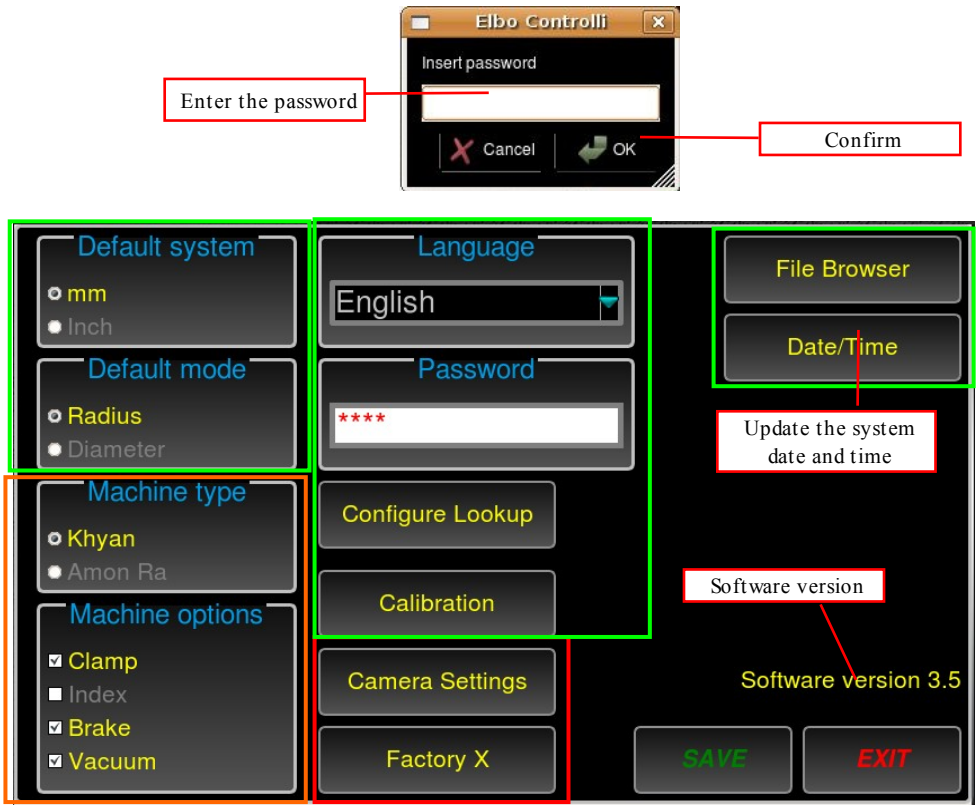


Figure 19: Software configuration

– The functions that are marked with a green box can be customised by the final user according to the specific needs.
– The functions that are marked with an orange box concern the operation of the presetter and, even if they can be modified by the final user, they could change its correct operation.

- The functions that are marked with a red box are protected with a higher-level password that is not known by the final user and it can be used only during the testing operation or by ***Service*** technicians; furthermore, the aforesaid functions relate to the presetter calibration.

- **Default system** is the measurement system that the presetter will activate by default at start (millimeters or inches).
- **Default mode** is the measurement mode that the presetter will activate by default at start for the X axis (radius or diameter).

☑ When you activate a machine origin, these two functions will be overwritten by the ones that are set in the same machine origin.

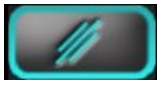
- **Language** allows setting the language that is used by the software: the new language that is selected will be active at the first system restart.
- **Password** allows modifying the password (default value: **elbo**) that will be asked for to access specific software functions (ex. the access to the machine origin).

- **Configure Lookup** opens a window that allows creating the customised list with the types of spindle taper, machine tool and tools that are normally used; the above-mentioned lists will be displayed in the drop-down menus while filling in tool set and machine origin tables.

To add entries to a list, write the text in the desired column, and then press the confirmation key.

To remove an entry from the list, select it with the mouse, and then press the relevant deletion key.

To go back to the previous page, press the exit key.



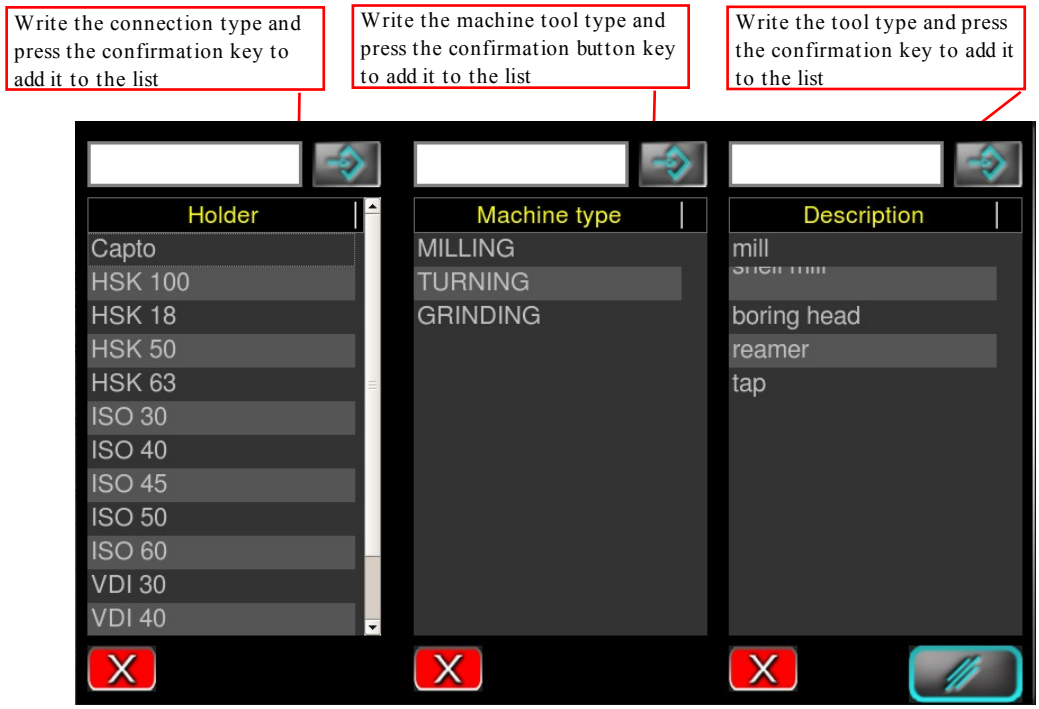
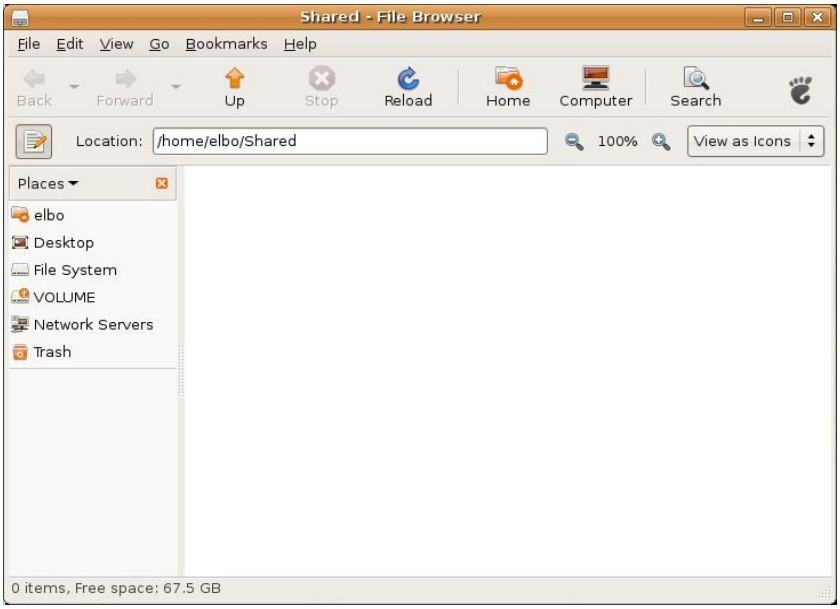


Figure 20: Lists configuration

- **File Browser** allows accessing the shared folder: /home/elbo/Shared in the hard disk; this folder can be used to exchange files with other computers if the presetter is connected to the corporate network.



☑ In this window, the user may access the other system folders that are to be found within the hard disk; the possible modification or the deletion of the files out of the "Shared" folder may make the measurement software unusable.

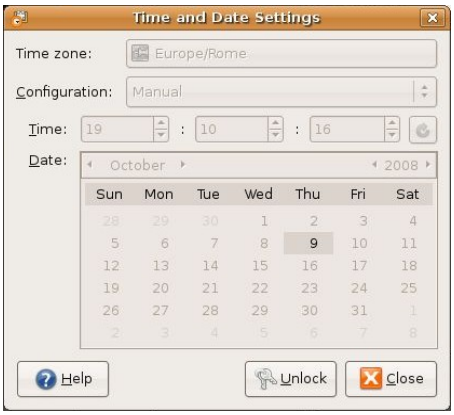
– **Machine Type** specifies the presetter model that is being used; obviously, as the machine has a different functionality, the modification of this parameter would change the operation of the Khyan presetter.

– **Machine Options** allows enabling or disabling the functions that concern the spindle, which are examined in paragraph 7.4 (brake and spindle index, mechanical clamping of the tool and contact check between the tool and the spindle taper by vacuum); the presence of the flag means that the function is active.

☑ The activation of the spindle index function can be used only in the presence of VDI-type spindle holders.

The **Camera Settings** and **Factory X** functions, as already mentioned, can be used only during the testing operation and by ***Service*** technicians**,** as they concern the presetter calibration procedure.

The **Date/Time** function to update the date and the time in the system, instead, needs a different password that cannot be modified by the final user: after you press the Unclamp key, type in "presetter" in the password field, and then perform the adjustment.



Once the configuration has been completed, press **SAVE** to exit the setup and save the modifications or **EXIT** to cancel them.

8.2.3 Calibration

The calibration procedure allows to define the pixel/image sensor micron ratio, this operation it is performed at the factory but can be necessary do it again in case of replacement of the image sensor.
After pressing the "Calibration" button this window will appear on the screen:

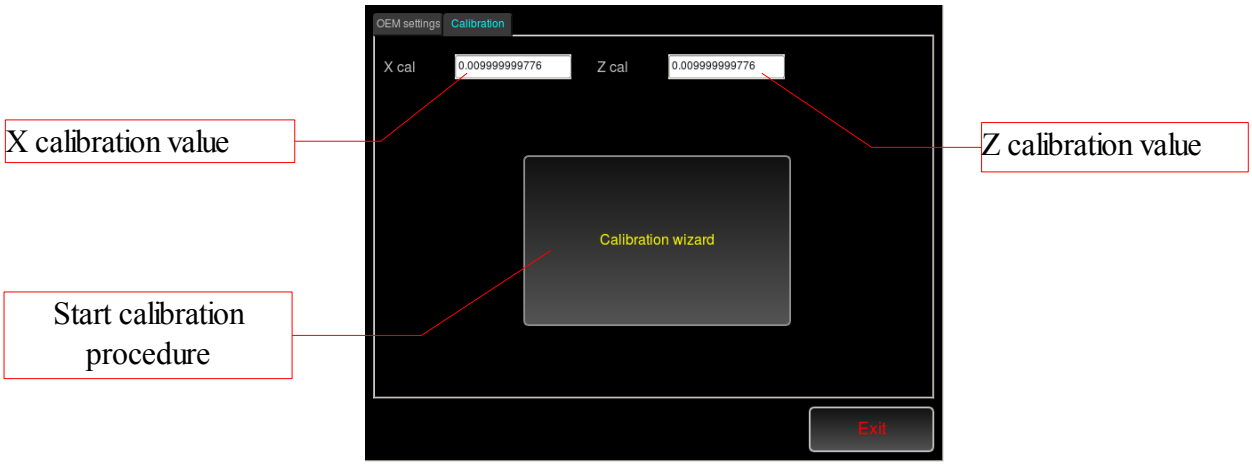


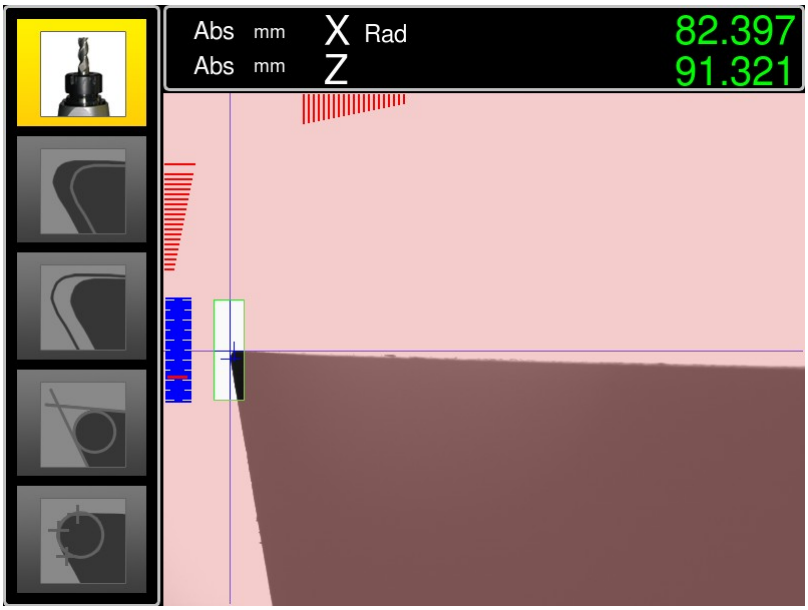
Figure 21: Calibration

In this window it is possible to verify the current axis' calibration values and activate the procedure to identify new calibration's values.

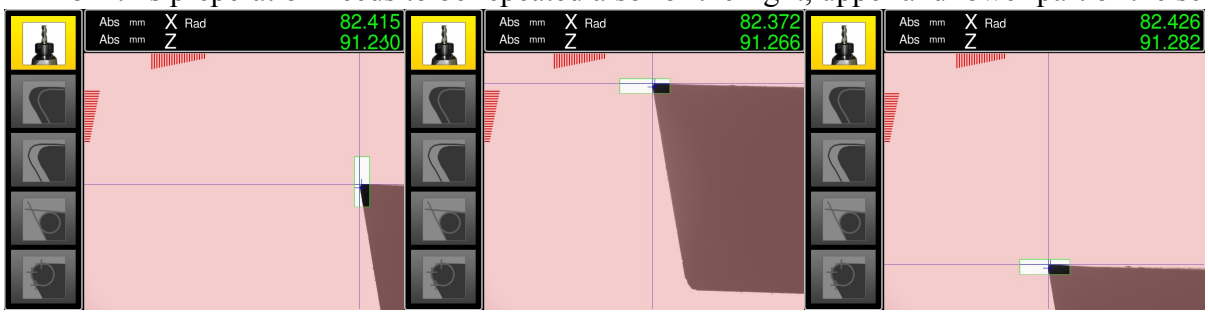
☒ *presetter configuration procedure*

- insert a toolholder in the spindle, clamp it, search best focus and activate the spindle brake;
- start calibration's procedure clicking the "Calibration wizard" button;
- on the main screen will appear:

- auto-targeting measurement will be automatically activated and on the socondary screen will be highlighted the area wherethe tool shadow need to be placed:



- once placed the tool shadow in the highlighted region and set the best focus, confirm by clicking the “ok” button in the main window:
- this preperation needs to be repeated also for the right, upper and lower part of the screen:



- once acquired the lastcalibration point the new calibration values would be immediately stored and activated.

8.2.4 Factory X

FACTORY X parameter is the exact distance between the center of the presetter spindle and the reference zero point of the X axis measuring system.
This value can be usedfrom the user in order to create machine's origins, as reference value for X axis.
Calibration is also done for the Z axis referring to the ISO norm,but this can be subject to slight variations when the toolholder is mounted in the machine tool spindle; befor using this value to create machine's origins as reference value for the Z axis, it is advised to verify the correspondence with the machine tool value.

FACTORY X parameter is set at the factory during final testing of the machine using a reference certified gauge.

The calibration of this parameter for the X axis is needed in the following cases:

- replacing of the X axis detection system .
- disassembling of the X axis detection system for maintenance.

The calibration of this parameter for the Z axis is needed in the following cases:

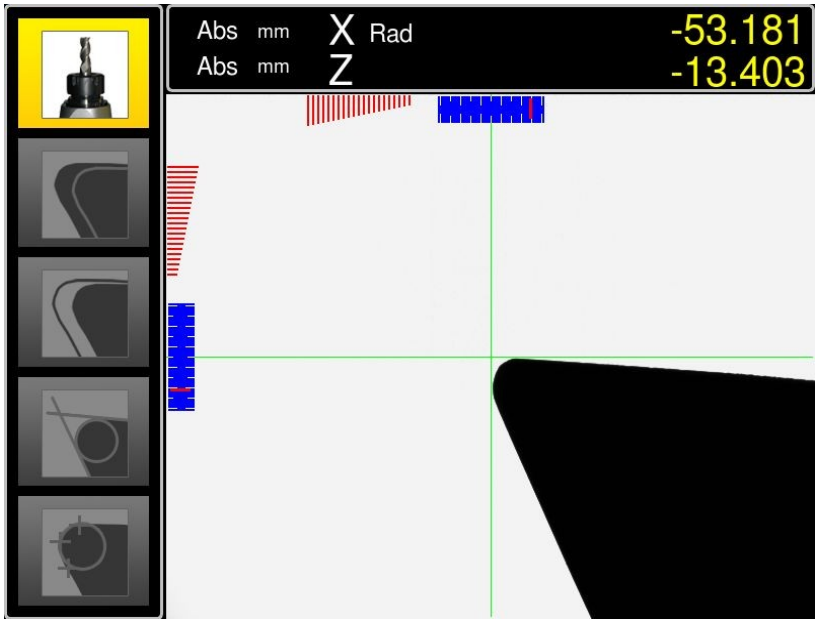
- eplacing of the Z axis detection system ..

- disassembling of the Z axis detection system for maintenance.

Both the parameters need to be calibrated in one of the following cases:

- Replacement of the camera system.
- Replacement of the 204 electronic, in case you don't have a back-up file of the previous electronic.
- Mechanical operations on the spindle bodyand/of presetter column.

Insert gauge or toolholder into the spindle body, than clamp it.
On the camera system screen mounted on the machine, frame the tool, bring it to the center of the screen.
Rotate the spindle and, using the blue comparator that appears for each single axis close to the reticule point of tangency until you reach the maximum tangency point.



Once reaching the maximum point of tangency, stop the spindle rotation.

Press the “Factory X” button to activate the input dialog window for entering the parameters and start the procedure.

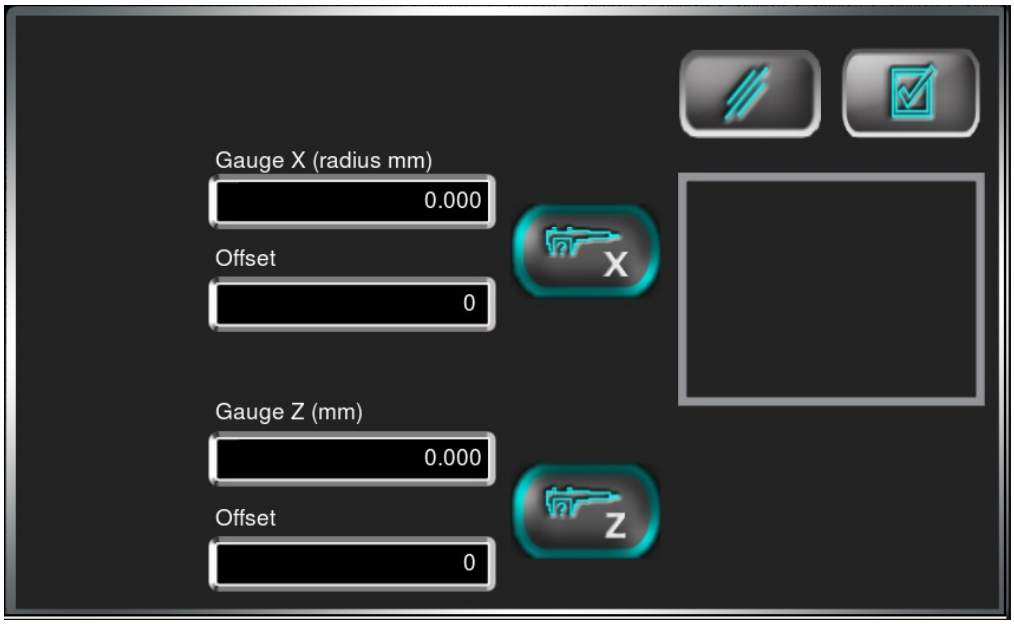
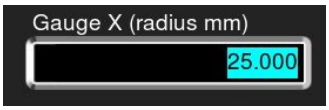
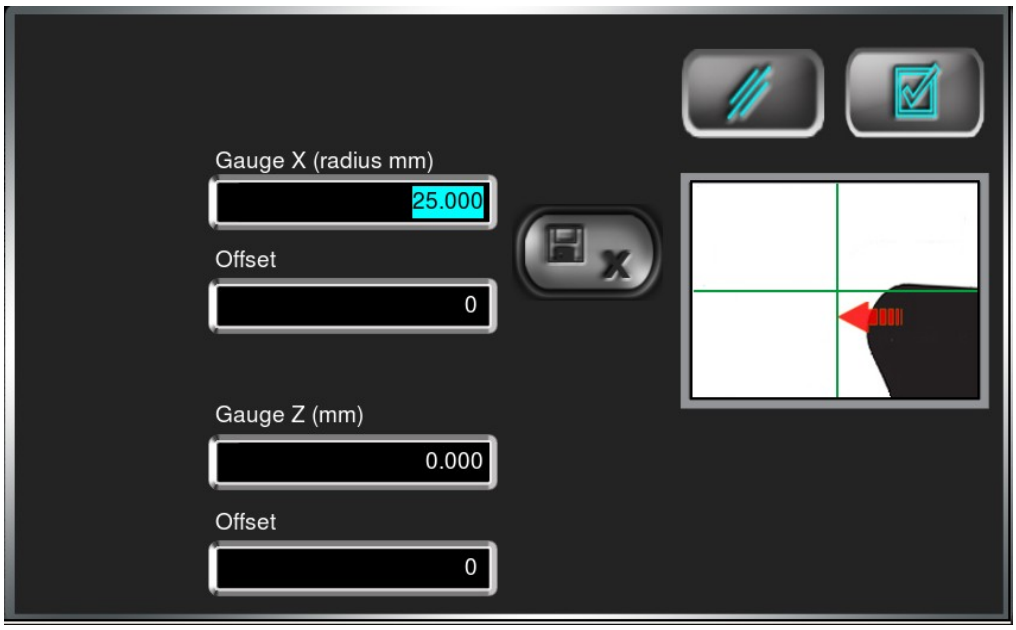


Figure 22: Factory X/Z measurement

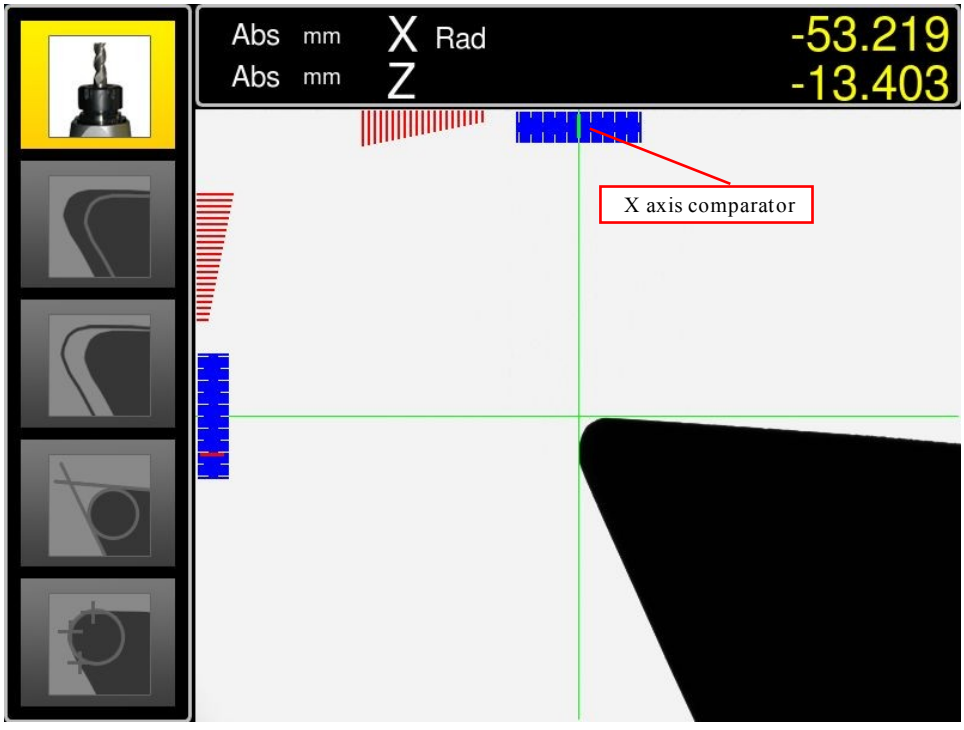
Fill in the box relative to the radius of reference's master gauge.



Clikc on the botton for X axis reference measurement.
The following screen will be displayed:



Move the X axis in order to bring the tool profile in collimation with the fixed reticule.
This operation will be facilitated by the blue digital comparator that appears when the axis is almost tangent to the reticule, the reference pointer then becames green to precisely indicate the perfect contact with the fixed retcule.



When reaching the point of contact with the fixed reticule (comparator to zero and green pointer),this will enable the validation key. Click it in order to save the reference value for X axis.

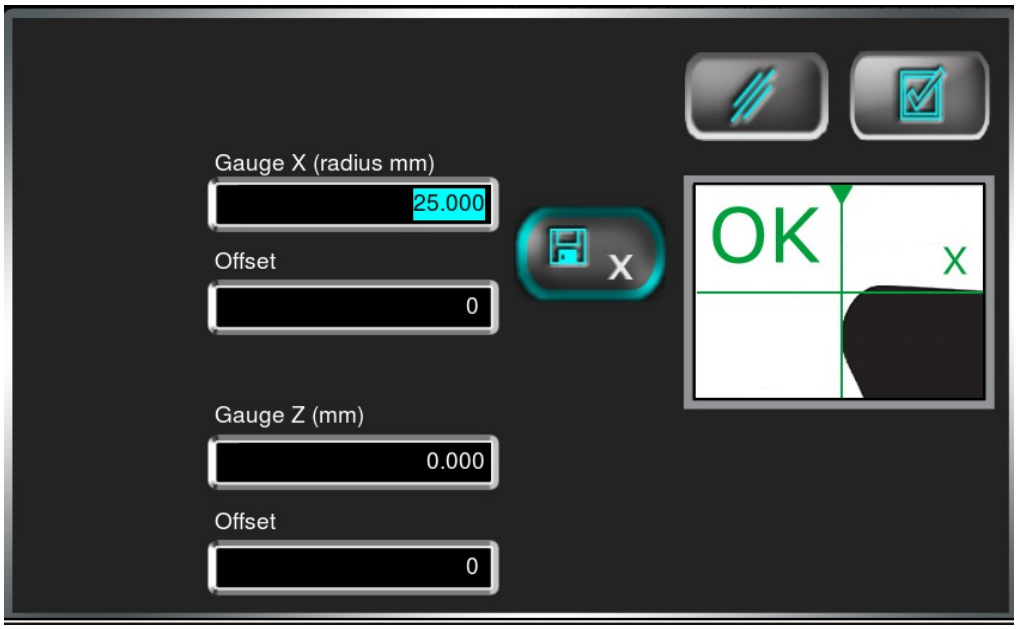
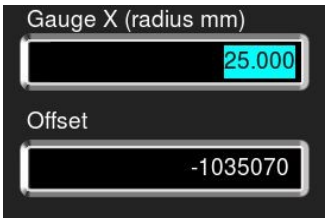
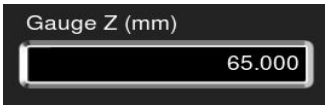


Figure 23: Save factory X

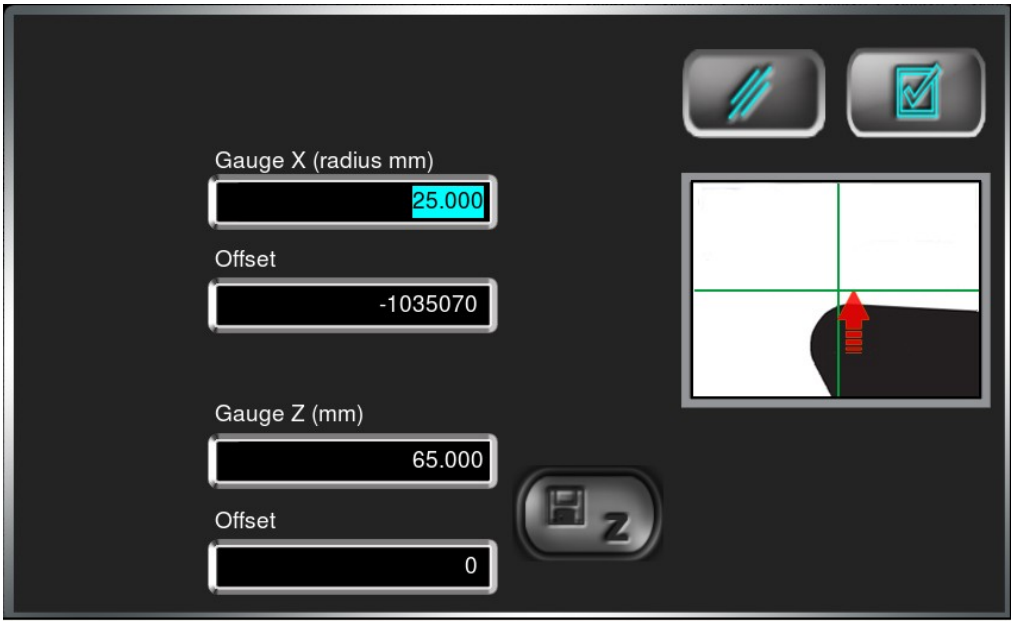


Begin now the same procedure for Z axis.
Type in the relative box the master gauge height.

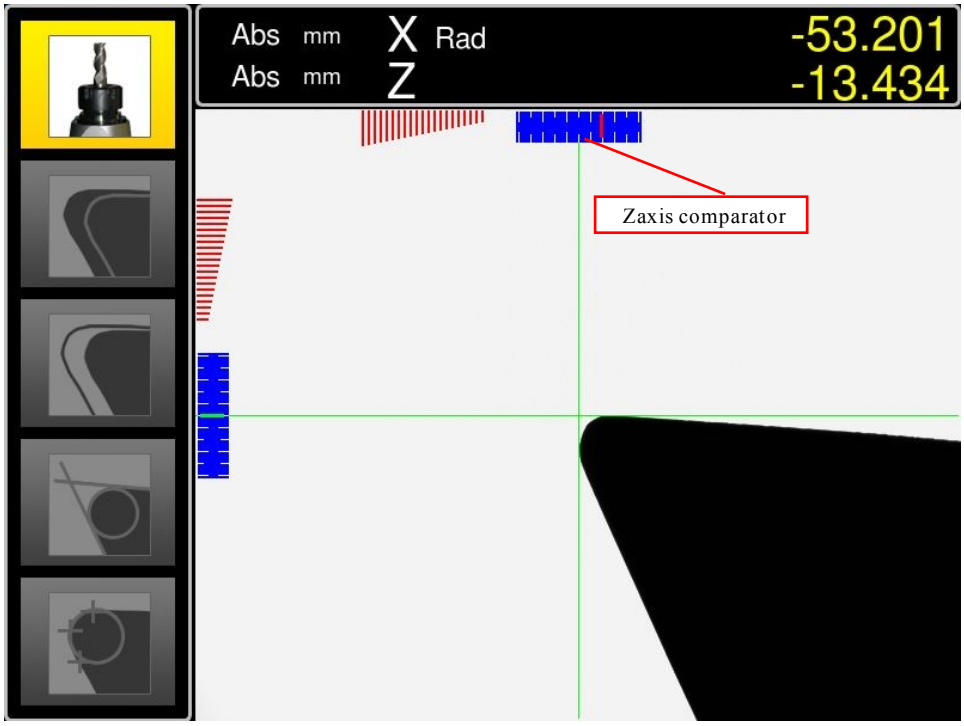


Clikc on the botton for Z axis reference measurement.
The following screen will be displayed

At the end confirm the Factory X values by clicking the button:



Move the Z axis in order to bring the tool profile in collimation with the fixed reticule.
This operation will be facilitated by the blue digital comparator that appears when the axis is almost tangential to the reticule, the reference pointer then becames green to precisely indicate the perfect contact with the fixed retcule.



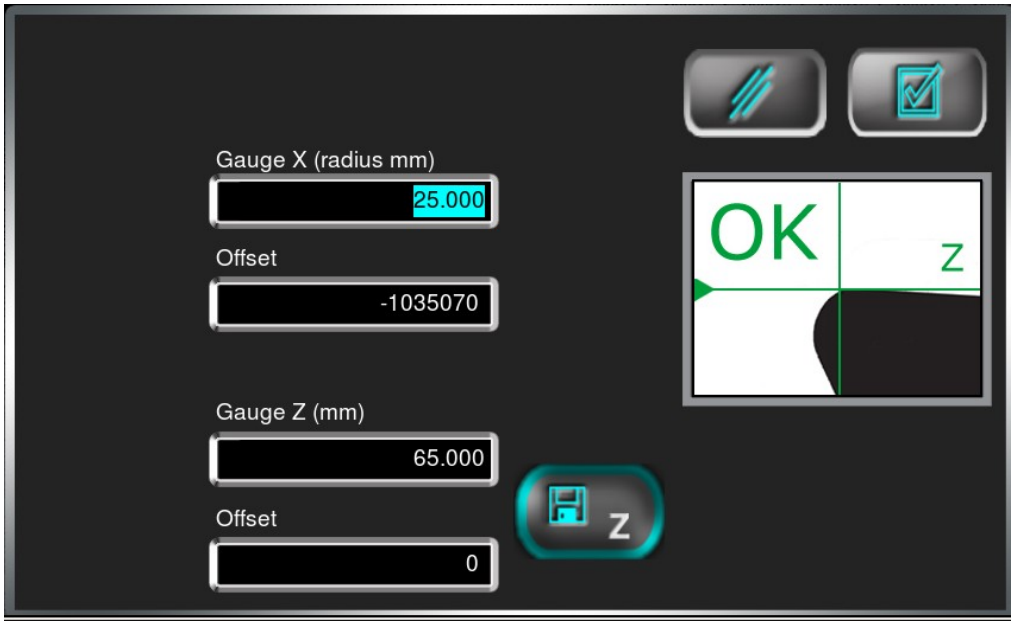
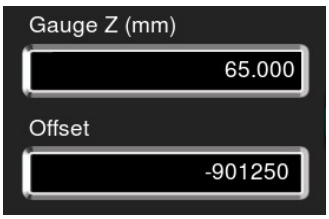


Figure 24: Save factory Z

When reaching the point of contact with the fixed reticule (comparator to zero and green pointer), it will enable the validation key. Click it in order to save the reference value for Z axis.



The procedure is finished; the acquired values are now available and can be used as dafault values in order to create machine origins.

9 106V VISION SYSTEM

9.1 Foreword

The operating principle for the 106V camera is similar to the optical profile projector: a collimated light source projects the tool profile that is placed between the two elements over a 1.3 Megapixel C-MOS image sensor, by means of suitable shooting lens.
The outline of the tool that is acquired by the image sensor is displayed in real time on a 10.4" diagonal-line TFT color display and in the 17" monitor of the machine; the framed field is about 12.8 mm x 10 mm, four times bigger than the standard size.

To make taking the measurement easier, it is possible to choose the digital representation with the maximum contrast, an alternative to the taken analogical image. Furthermore 106V is equipped with two bars for the focusing control of image, one takes the focus of X axis measurement's point, the other one for the Z axis, helping the operator to find out easily the point of maximum tangency of the tool.

Like projectors, angles and radii may be measured too, and the tool and reticle profiles may be compared directly on the screen. But the real advantage is the elimination of the measure subjectivity typical of optical systems, which makes measurements objective and repetitive.

106V can analyse the sharp tool and find its measurement points on the profile with a 1μm definition. The operator can decide to measure on the central fixed grid with the visualized analogical comparators on screen, automatically obtaining a measurement, in real time from the sum between the coordinates of central grid and the relative position of the image. In both cases the measurements are continuously shown on screen, in order to have all the necessary information in the same location

The 106V vision system also allows the automatic calculation of the geometric elements that are to be found on the tool profile (angles, radiuses), or in manual mode, the ones that are to be found both on the profile and during the inspection of the tool. The software will supply different display options and will allow saving them in graphic format.

9.2 Camera System Control

The camera functions can be activated by using the camera system control pannel on the main screen, in any case the status of active functions is shown in the secondary screen by lighting of the icon.

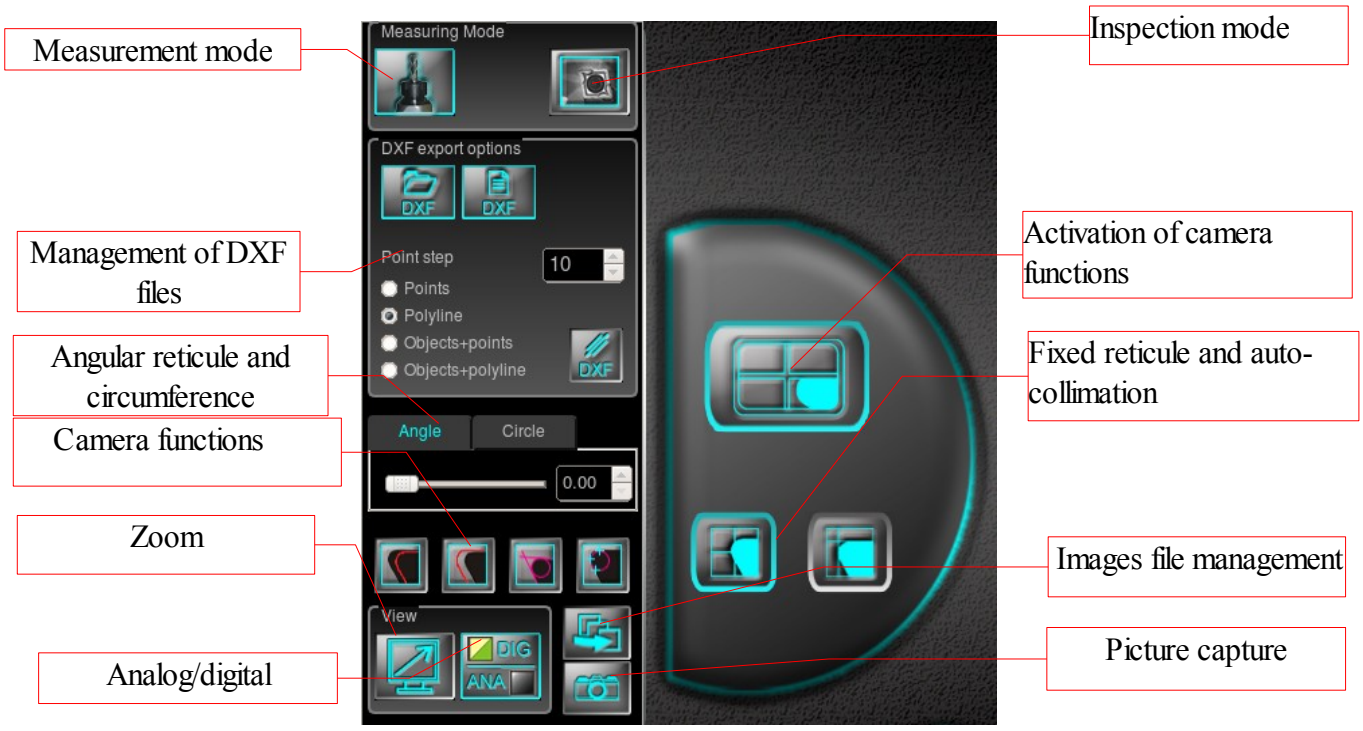


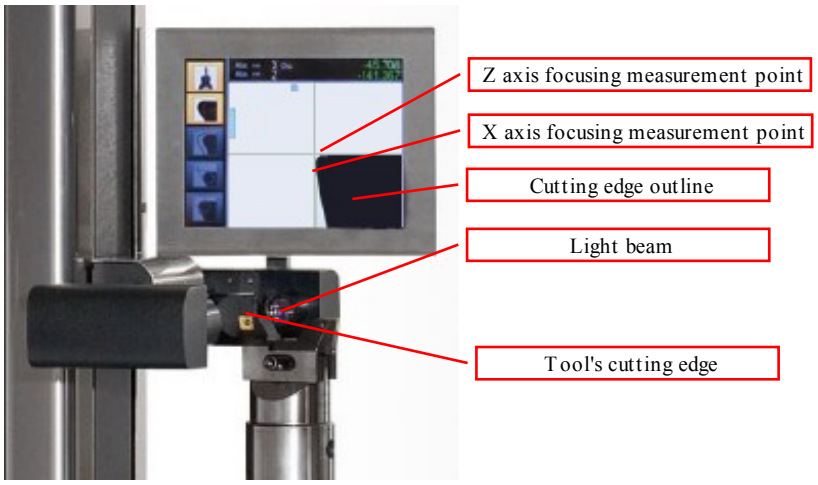
Figure 25: Camera system control

The picture lists all functionalities that are available for the measurement of the tool with the relevant geometric elements and for examining the relevant surface by means of the inspection mode.
However, before measuring a tool it is absolutely necessary to find out the maximum tangency points by focusing the outline of the tool.

9.2.1 Focusing of Images

With 106V the measurements are taken like those with an optical profile projector; it is necessary to frame the tool's profile on the screen, bringing it inside the light beam through the rapid and fine adjustments.
Before measuring rotate the spindle to search for the point with the best image focusing.
The screen always shows two control bars for the focusing of the image (one for each axis); just rotate the tool until the highest value on the axis bar concerned is reached, to obtain the best focus.

☑ *The dimension that the 106V takes as reference are those ones concerning X and Z measurement points. Look at the following picture.*



The control bars of the focusing give information concerning the sharpness of the image in the measurement points indicated in the picture; different indications (in the maximum value) between different tools, or different shapes of the same tool can be obtained. This varies according to the wear degree, or to the lip relief angle.
For a proper measurement the highest value, shown by the peak indicator on each bar, shall be reached.

Don't forget that the point where we have to measure is that one relative to the maximum tangency of tool, and that the focusing is necessary only to facilitate the research; in fact the **maximum tangency will be always in correspondence with the maximum value of focusing.** This also means that, in the range of the maximum value of focusing, a residue of measure incorrectness determined by the radius of the measured tool is included.

The following picture shows the relationship between the focusing value (index of the distance of the tool from the shooting lens) and the maximum tangency of the tool (index of the angular position of the tool against the spindle rotation axis).

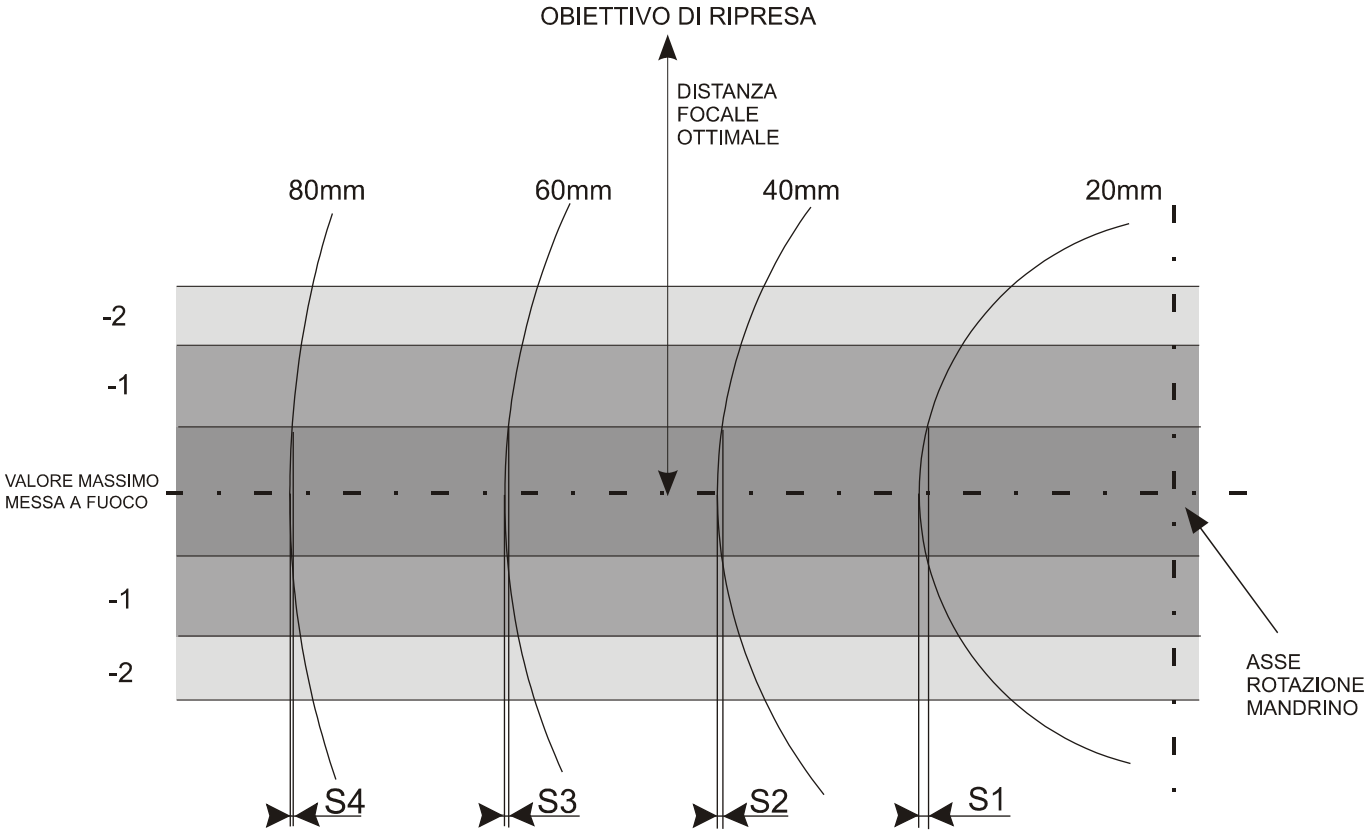


Figura 26: Imprecisione residua

The residue of measure incorrectness (S1, S2, S3, S4) clearly depends on the radius of the tool measured and corresponds approximately to 0.01 mm, for tools with a 20 mm radius, while it is lower than 0,001 mm. for tool radiuses exceeding 80 mm.
On the basis of these considerations we repeat the necessity to always reach the best obtainable focus, eventually finding the maximum tangency on the fixed grid as described previously

The first operation to carry out, after having introduced and clamped the tool in the spindle holder taper, it will be to search for the tool focusing point, and then the maximum tangency point. The display always shows two light-blue control bars (one for each axis); it is enough to rotate the cutting edge until reaching the highest possible value on the bar of the involved axis to achieve the best focusing.

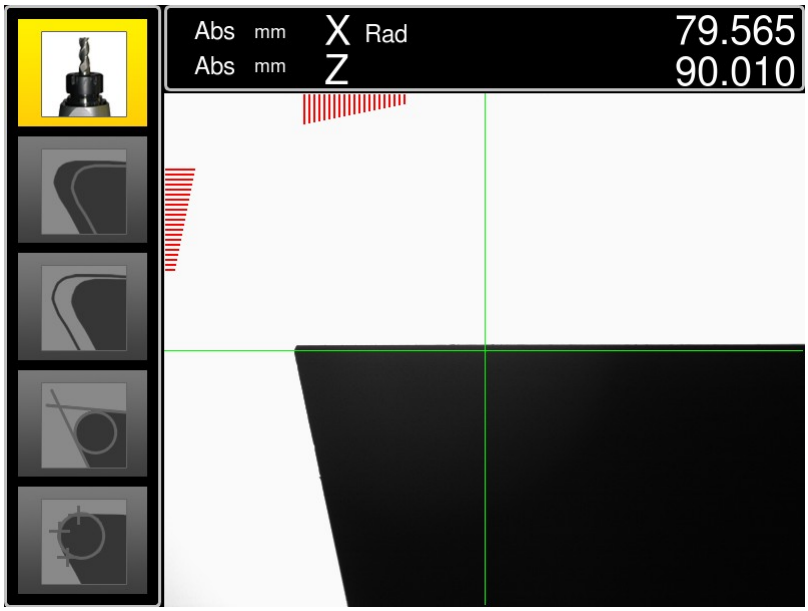


Figure 27: Best focusing

9.2.2 Measurement on Fixed Grid

The measurements on a fixed grid use the same techniques of an optical projector of profiles: you have to shift with the micrometric movement handles of the machine until you bring the tool's profile in tangency with the central grid on the screen.
The measurement with a profile projector is influenced by the capacity of operator to recognize the best focusing of image and its tangency with a serigraphic line (which covers the image) on the projection screw; it means that it is a subjective measurement.

The same operation performed with the 106V camera allows obtaining the same result, as the image profile is electronically examined, and the measurement is pointed out according to the scale of two blue-colored analogue comparators (one for each axis) that are shown in the display.

They allow carrying out the measurements and setting zero as if you used a traditional mechanical comparator with needles.

When the indicator line becomes green, it means that the tool has a perfect tangency with the reticule.

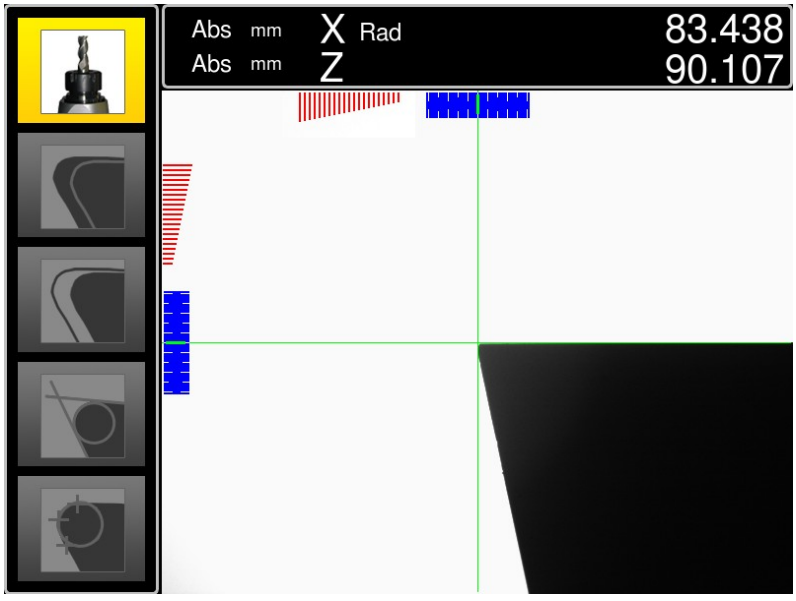


Figure 28: Axes collimator

☒ *Procedure of collimation on fixed grid*

- *Set the tool on screen (rapid movement).*
- Check that the tool's edge is without any dust, any debris or any other impurity, which could modify the result of measure.
- Focus the image, on the axis, which is intended to be the measured, by rotating the spindle.
- Focus the image, on the axis, which is intended to be the measured, by rotating the spindle .
- Research the point's maximum tangency by rotating the spindle and observing the analog comparator.
- Collimate the image with the grid, clearing the analog comparator (fine adjustment).

9.2.3 Auto-targeting

With auto-targeting it is not necessary to bring the image in collimation in a fixed point of screen; in fact it is enough to set the tool in the visual area of screen so that 106V can measure it.
Obviously, being able to measure on the whole vision area does not exclude the need to focus the image and search for the maximum tangency to obtain correct measurements.

By means of auto-targeting, the measurement is the result of the algebraic addition between the position concerning the image in the display and the position of the central recticule.

The presence of small differences in the dimensions that are automatically detected in the different points of the display is due to the processing tolerances for the lenses and the illuminator, as well as to other factors of mechanical, electronic and optical type.

Therefore, the measurement that is performed with auto-targeting, on the one hand allows an increased speed and simplicity of measurement, while on the other hand implies an increased tolerance compared to the same measurement performed in the fixed reticule.

During this type of measurement, the dimension display will be green.

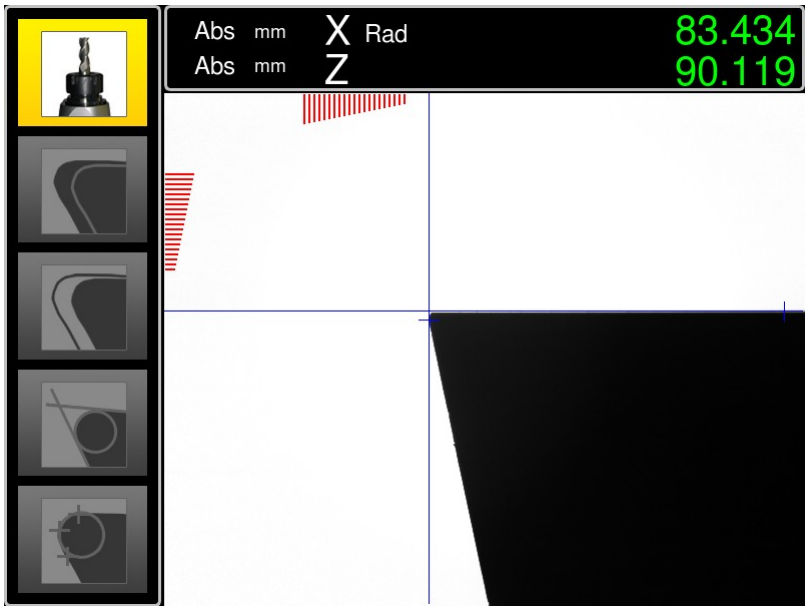


Figure 29: auto-targeting

☒ *auto-targeting procedure*

- *Set the tool in the screen (rapid movement).*

- Make sure the tool's edge is without any dust, shavings, or any other impurity, which could modify the result of measurement.
- Focus the image on the axis of measurement and always rotate the spindle, check numerically that the measurement you have taken expresses the maximum tangency of tool.

9.2.4 Particular Cases of Collimation

106V is able to recognize automatically the orientation of the tool and to measure it from left to right for X axis and from above or from below for Z axis.
After having framed the tool, the system examines the image and sets the suitable collimation direction.

The priority is given to the measurements starting from the left for the X axis and from the top for the Z axis; it means that, in the presence of two measurements that are valid for the X axis, only the measurement on the left will be considered.

Obviously, you can always choose between the auto-targeting and the collimation on the fixed reticule: in both cases, the 106V camera will automatically recognize the side of the tool that has to be measured.

Despite the 106V system being able to recognize and measure the tool profile independently from its orientation, there are specific cases in which the involved measurement cannot be carried out in an automatic way or with the help of digital comparators. It occurs when the point to be measured is inside the outline of the tool.
In these cases, the measurement must be carried out using the "Region Of Interest".

9.2.5 Setting of Analog/Digital Visualization

If you press these keys, you can change the image display mode from analogue to digital.
It is extremely useful for the operations concerning the manual collimation of points, for example in geometric calculations to better perceive the edge of the image.

The display mode does not influence the measurement of the tool by the 106V camera at all, both with fixed reticule and in auto-targeting.

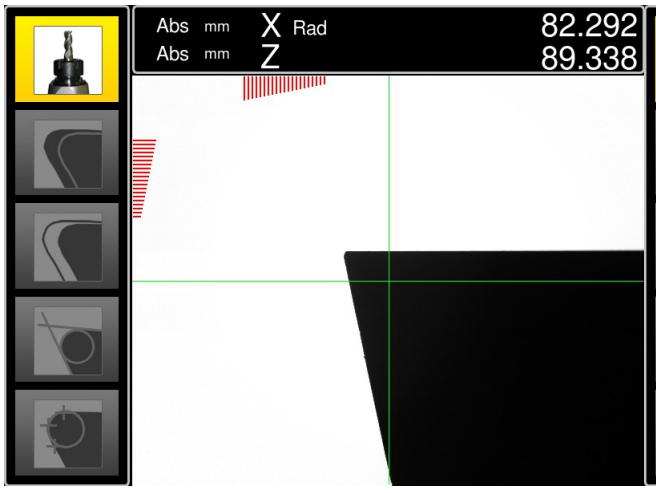


Figure 30: Analog image

Figura 31: Digital image

The two pictures display the same situation in analogue and digital modes.

9.2.6 Full Screen Mode

The zoom button allows switching alternately to show the image of the camera in full screen or scaled within a window in the software management.

The image on the screen provides greater accuracy in the visualization of details and a pixel corresponds to about ten microns .

The screen display includes the presence of a floating toolbar that replicatate the camera settings comands. Return to the previous display can be done in three different ways :

- press again the zoom button;
- press “ESC” on the keyboard
- right-click with the mouse and select "zoom switch" from the menu

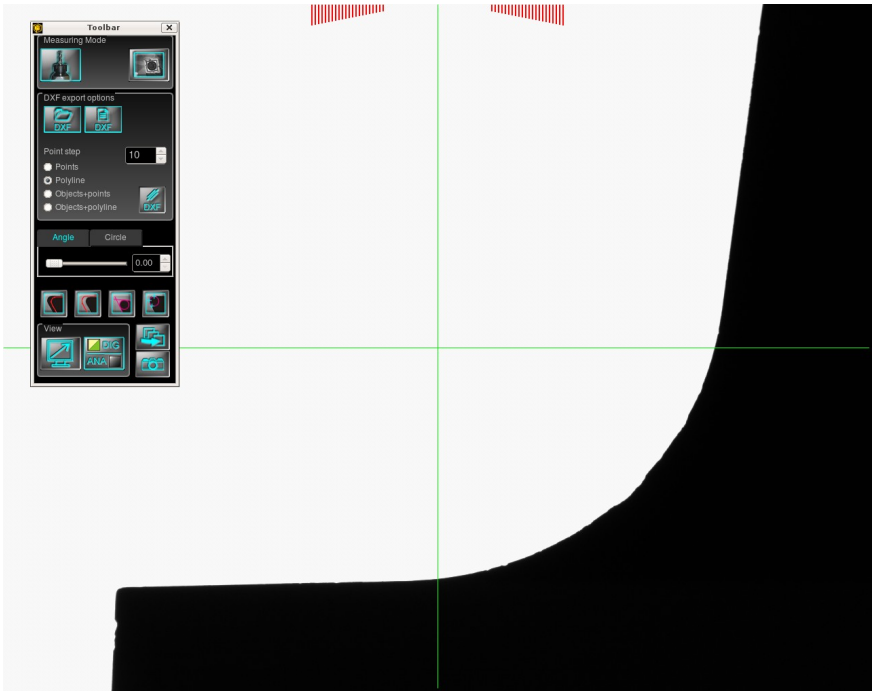


Figure 32: Full screen camera system

☑ *The magnification factor of full screen is about 26X while the reduced screen is 13x .*

9.2.7 Drawing and Storage of Tool Profile

By using the 106V vision system, you can create and keep the tool profile outline overprinted in the display; this function is mainly useful because it is possible to use the outline of a cutting edge to adjust the following ones on a tool with inserts or, more simply, to control their alignment.

The functions that are described below are active in all modes: analogue, digital, fixed reticule and auto-targeting.

If you press this key, you will activate the storage of the tool profile; a red-colored line is drawn on the display and it follows the profile of the tool during the rotation of the spindle holder, while the tool outline is drawn in black with the maximum profile that is reached during the rotation.

If you focus all cutting edges, it will be possible to compare them and perform the necessary adjustments; if you activate the geometric calculations in this mode, they will be carried out along the red-colored mark, which specifies the position of the tool in that moment.

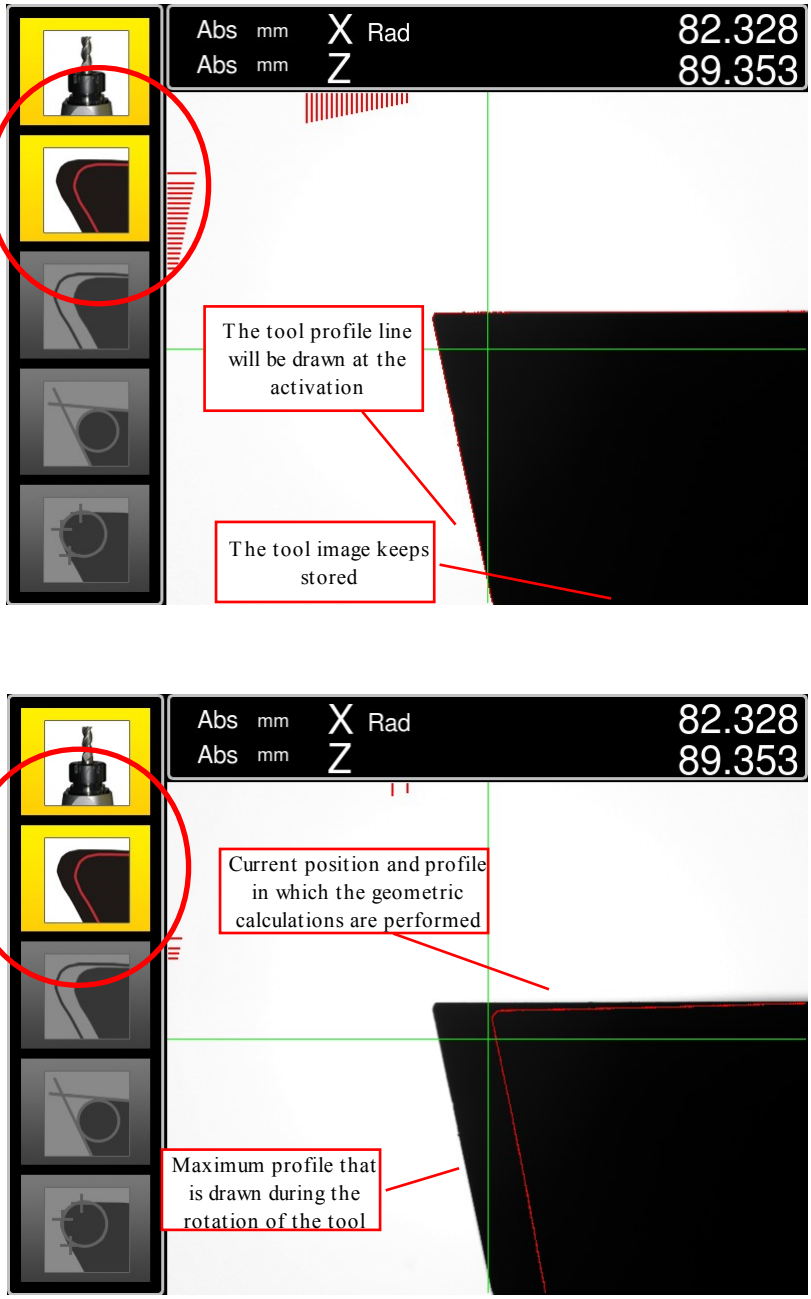
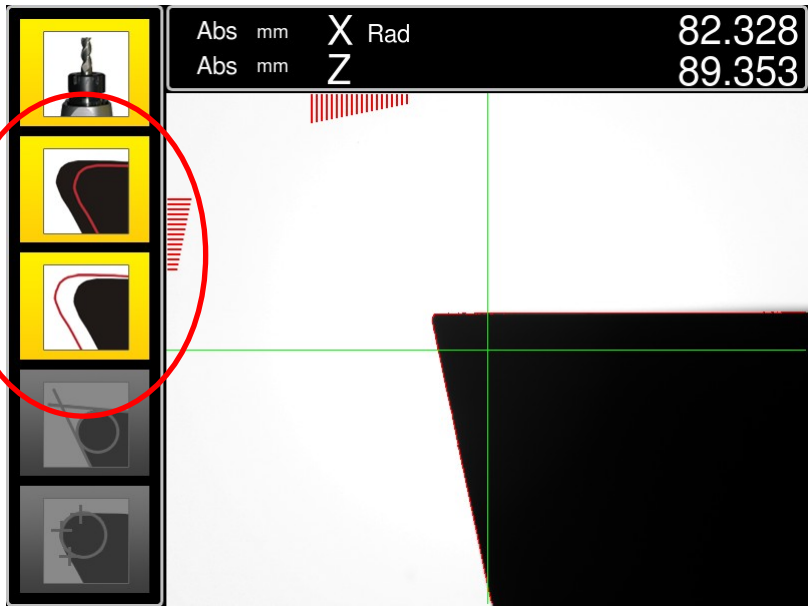


Figure 33: Profile memorization

If you press this key now, the red profile will move along the line of the maximum drawn profile and will leave the position of the tool; you still have the stored black-colored tool drawing.



Now deactivate the storage function by pressing the key once more, in order to have only the maximum profile red line on the display; you can perform the geometric calculations on the aforesaid red line.

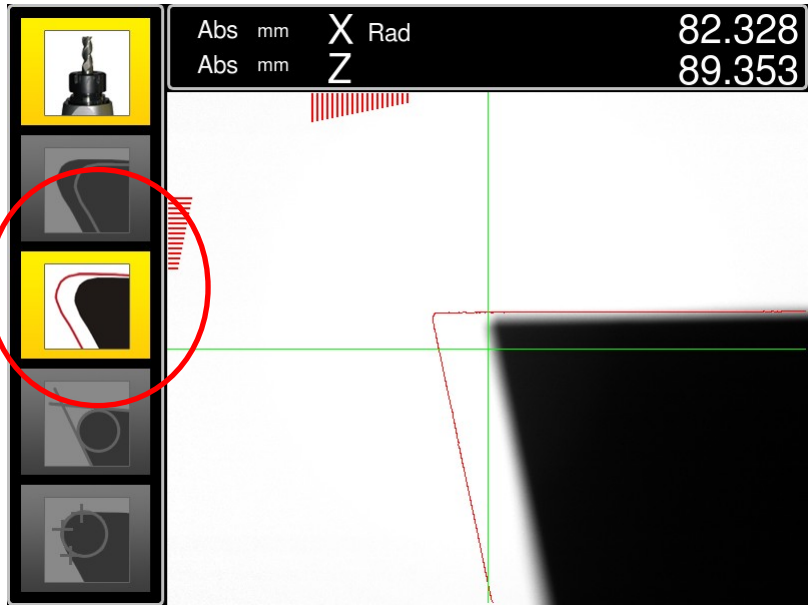


Figure 34: Memorized profile

9.3 Geometric Calculation

This chapter deals with the description of the geometric calculations supplied by presetter Khyan; for each function, the procedure to be followed for measurement takings is described.
Each function allows the math calculation of the geometric element chosen passing through the points indicated. The calculation accuracy equals eight decimal numbers.

As for the derived calculations, instead, the maximum accuracy equals 1/100.

Any mistakes noticed depend on incorrectness in the choice and in the point detection or on tools' shape mistakes.

Here are some important recommendations for a calculation result as precise as possible:

- Always choose the two points close to the ends of the geometric element to be calculated, in the case of the circle choose the three remaining, at uniform distances from the two ends;
- Each point to be detected shall be positioned on the optical axis of the presetter; that is, it shall be focused. In the case of an angular mill, for instance, the angle we shall measure is positioned along the helicoidal part of the tool. First of all, the spindle shall be rotated to focus the mill part chosen, and then detect the point. The operator shall carry out this operation subjectively, as the focusing indications supplied by 106V are valid only for the collimation points and not for the point we want to detect for the calculation;
- To better appreciate the focusing of the point to detect, it is recommended to operate in analog mode;
- The spindle rotation for the focusing of the points to detect is necessary not only for the mills, but also for tools with inserts having a lip relief angle.

During this phase, the detection of the dimensions is performed in the 17" LCD monitor.

9.3.1 Automatic Measurement of Angles and Radiuses

This function allows automatically identifying and calculating the inclination of all straight lines, the value of all angles and the measurement of all radii that are to be found in the framed profile, by displaying the relevant coordinates and allowing their acquisition for filling in the tool table or for the quick printing of a label.
When the function is activated, it works in real time. This means the profile is constantly examined, thus it is up to the operator to decide if the data is exact or not.
Like auto-targeting, the operator has to make the visualized image as clear as possible in order to measure it: focusing and cleaning it from dust and sharpening remains, framing it correctly.

In this case, all aspects become more important, as the automatic calculation of the angles involves the entire profile and not only the points with maximum tangency; this is the reason why it may be useful to work on a previously stored profile.

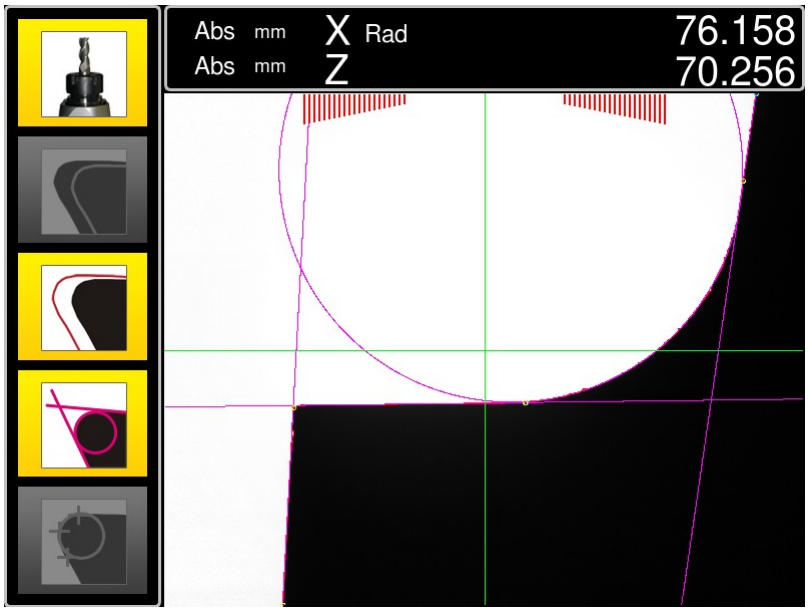


Figure 35: Automatic geometry calculation

If you activate this function, all straight lines and the circumferences that concern the geometric elements that can be recognised within the framed profile will be displayed in violet color.
If you click with the pointer on the desired line, you can display and import its characterising data (in the example below, the profile storage is active).

Figure 36: Angle input from automatic calculation

After selecting the desired entity it is possible to send the angular values either to tool set table or label printer (depending on the active function).

As for the circumferences, the system will allow knowing the coordinates for the center and the radius, which in their turn can be introduce into the tool table or the quick print of the label within the "Corner Radius" field.

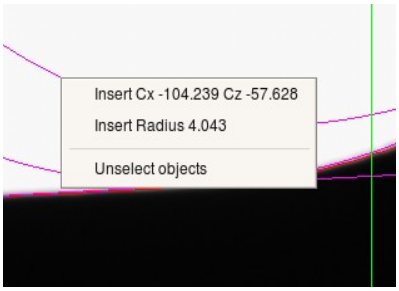


Figure 37: Radius input from automatic calculation

In case a line is selected and then an other one that cross the first one is selected it is possible to obtain the value of the point of intersection.

Figure 38: Intersection input from automatic calculation

☑ These measurements have been derived by geometrical means, calculations can have an inferior precision up to 10 micron. The angular measurements are not able to be more precise then 0.005°.

9.3.2 Geometry Tool Bar

The automatic geometry calculation functions are designed for the best geometrical determination of authorities for the tools most consumed, in a case you have a specific necessity it is possible to alter some parameters to better adapt itself to a special situation.

These default settings cannot be changed by the user, however there are a set of custom parameters available that can be saved for future re-use.

Figure 39: Geometry instruments bar

The parameters of line quality and circle quality represent the search criteria sensitivity, lines and circles with high values will search for points (lines or circles) that overlap objects perfectly, lower values will increase the tolerance in the search for these objects.

The minimum length parameters (line and arc) represent the smallest dimension for the determination of an object, the smallest dimension it will search. For the line it represents the length of a line while the arc represents the diameter of a circle.

The step parameter represents the frequency of analysing the points of the profile, low values will achieve better results but risk individualizing object you do not want.

9.3.3 Control of Angles and Radiuses with Mobile Reticule

In combination with the fixed reticule, you can display an angular reticule by setting the relevant degrees or a circumference by setting the relevant radius
In the first case, if you make the axes of this reticule collimate with the tool profile, you can read the inclination of a straight line (ex. lip relief angles, tilt angles for the tools, etc.).

The rotation can be carried out by using the cursor or by manually entering the value of the angle to be set with a maximum accuracy equalling 1 hundredth of degree.

If you restore the cursor to zero or manually enter the 0.00 dimension, the angular reticule will disappear from the screen.

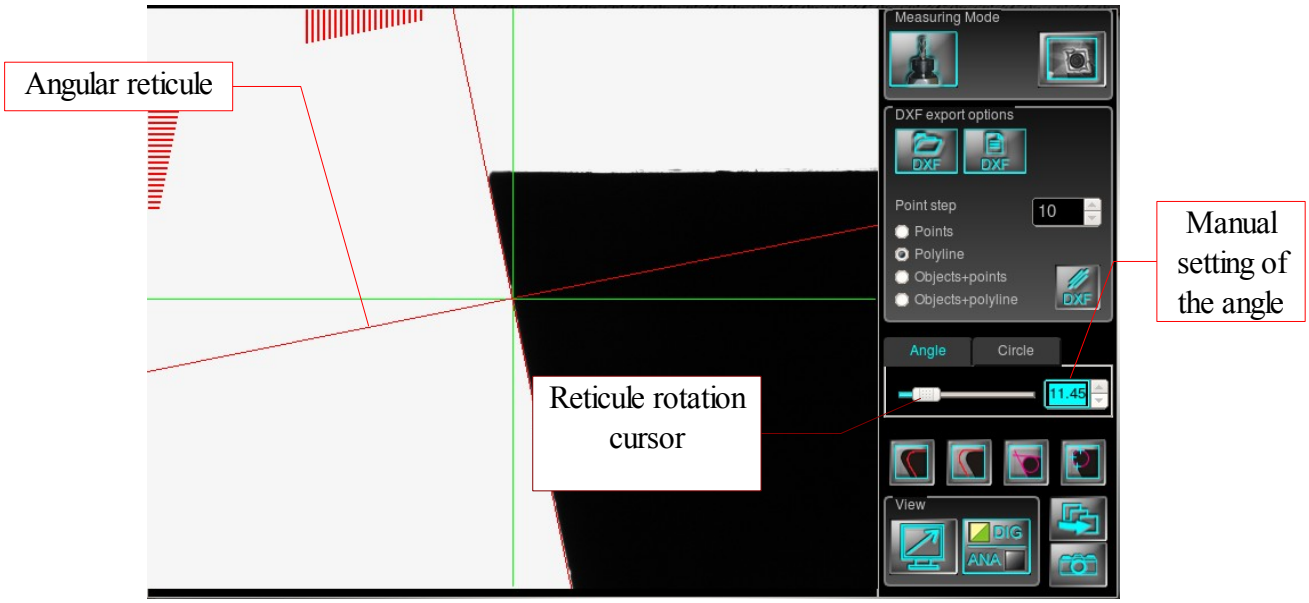


Figure 40: angular reticule

In the second case, if you make this circumference collimate with the tool profile, you can assess the radius of a curve (ex. the radius of an insert).
The radius can be set by using the cursor or by manually entering the value up to maximum 5mm.

If you restore the cursor to zero or manually enter the 0.00 dimension, the circumference will disappear from the screen.

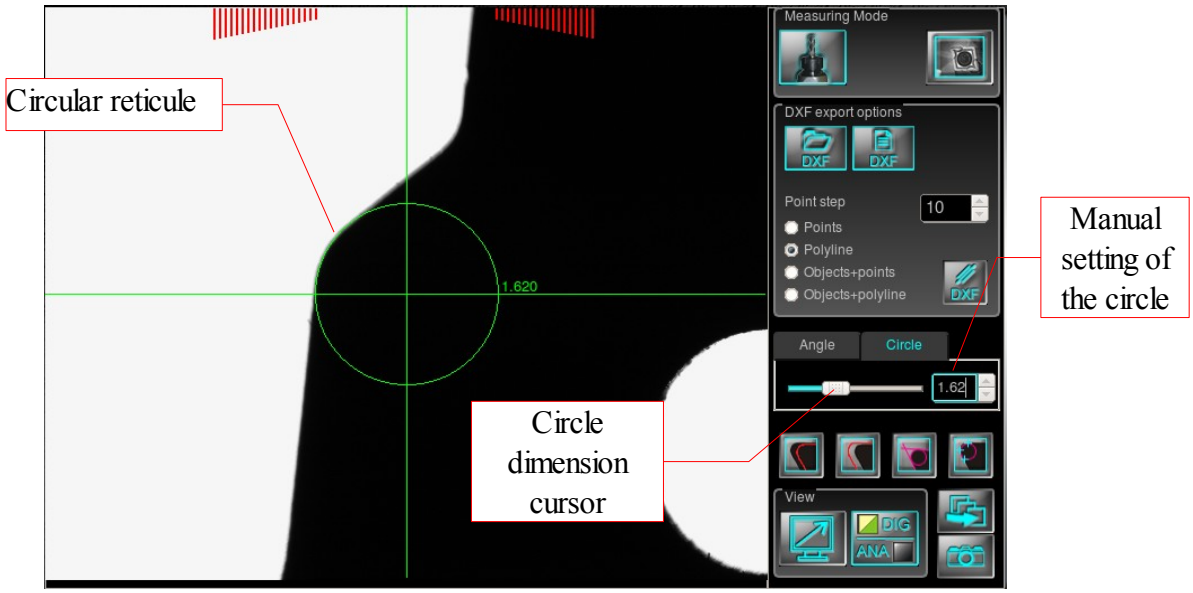
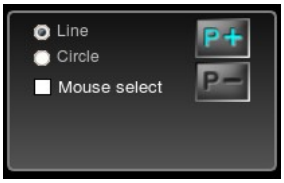


Figure 41: Circumference reticule

9.3.4 Distance Between Two Points and Calculation of the Circumferences

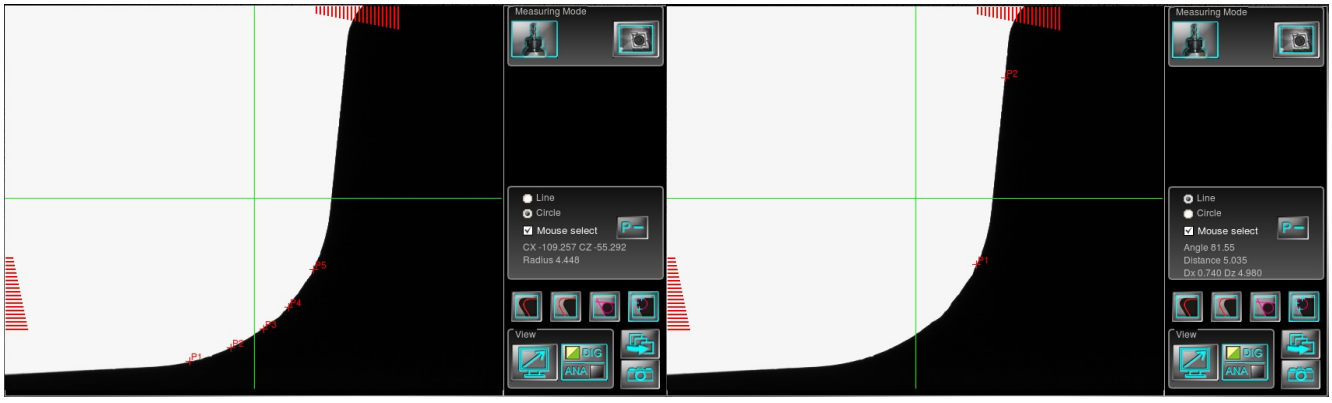
If you press this key, you will activate a function that allows the system to calculate the distance between two points by supplying the inclination of the straight line that joins them or a circumference that is obtained from the sequence of at least five points whose radius and center coordinates are known.



The system provides for two point acquisition modes:
- by means of collimation at the center of the fixed reticule
- by means of a selection performed with the mouse.

First of all, you need to specify if you want to calculate a “Line” or a “Circle”; now, it may be very useful to activate the full display view, which shows the area of the camera over the entire 17” display.
Obviously, this operation will make the point acquisition more accurate, and thus the result of the calculation.
If you decide to acquire the points by means of a fixed reticule, you will have to make the collimation in sequence of the two points of the straight line or the five or more points of the circumference with the center of the fixed reticule, and from time to time press the “P+” key to acquire them; you can cancel a non-corrected point by pressing “P-”.
If you press the “Mouse select” key, the points (always in sequence) will be acquired with the pointer of the mouse, and you can cancel one or several points by using the “P-” key, as well.
When all points have been acquired, the system will automatically display the result.

The following screens display two examples of acquisition (straight line and circumference) that were performed by using the pointer of the mouse.



9.3.5 Graphic Measurement Functions

The software of the Khyan presetter provides for the possibility to perform quick measurements directly in the camera area within the 17” monitor.
Again, it will be necessary to use the full display mode, which allows an increased accuracy in the selection of measurement start and stop points.
By pressing the right mouse button, it will display a menu that lists the activated functions :

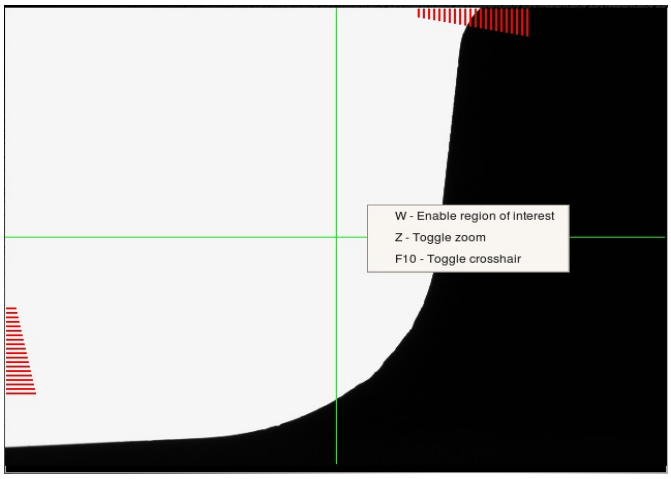


Figure 42: Graphic measurement activation

Commands can be given either by selecting withe mouse the desired item or by keyboard using the key indicated in the window.

If you press the F10 function key, the display will show a second yellow-colored reticule connected to the position of the mouse, which will allow performing the following measurements in the video.

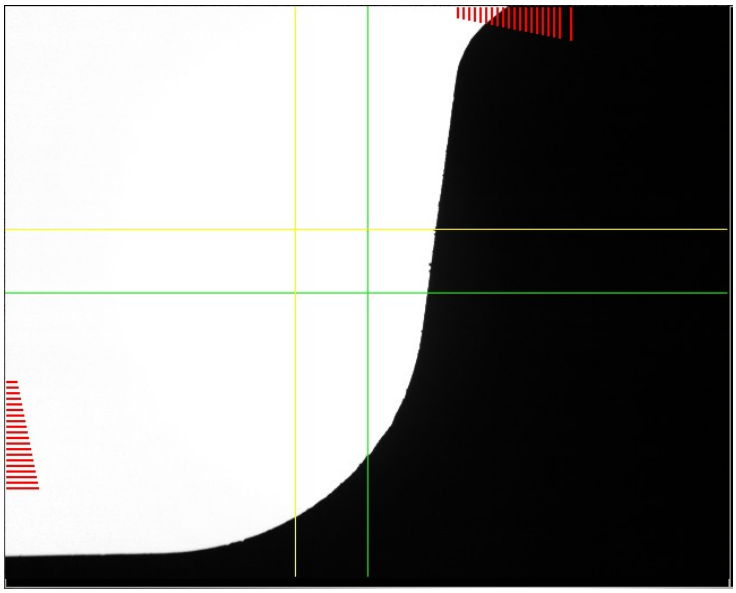


Figure 43: Graphic measurement pointer

Once activated, the measuring pointer allows acces to new functions by clicking the mouse right button.

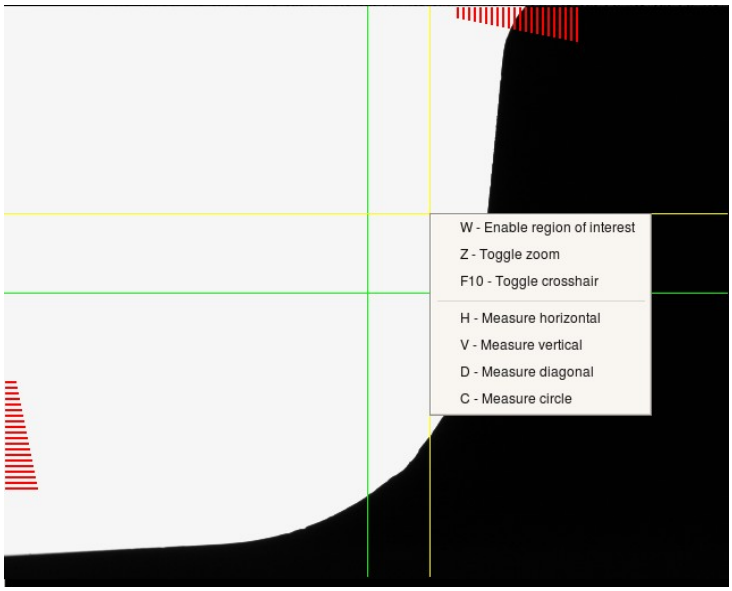


Figure 44: Select graphic measurement type

If you press the "H" key in the keyboard, you will be allowed to measure the distance between two points that are placed along a horizontal line;

- place yourself in the point where you want to start the measurement
- press and release the left button of the mouse
- move the mouse along a horizontal line until reaching the point in which you want to end the measurement, and then, in the video, read the distance between the two points, the inclination angle and the coordinates of the arrival point
- press the "H" key once more to end the procedure.

Figure 45: Horizontal Graphic measurement

If you press the "V" key in the keyboard, you will be allowed to measure the distance between two points that are placed along a vertical line;

- place yourself in the point where you want to start the measurement
- press and release the left button of the mouse

- move the mouse along a vertical line until reaching the point in which you want to end the measurement, and then, in the video, read the distance between the two points, the inclination angle and the coordinates of the arrival point
- press the “V” key once more to end the procedure.

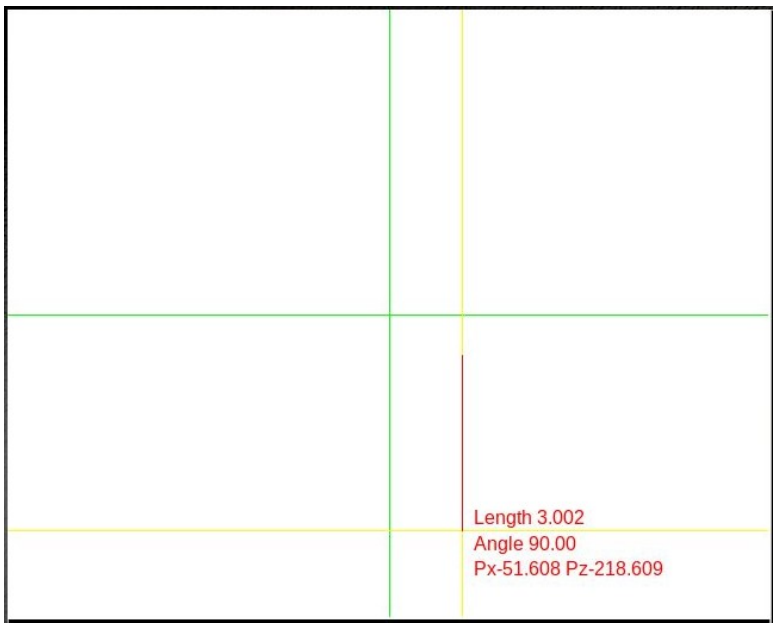


Figure 46: Vertical graphic measurement

If you press the “D” key on the keyboard, you will be allowed to measure the distance between two points that are placed along a diagonal line and to know the angle of the drawn straight line;

- place yourself on the point where you want to start the measurement
- press and release the left button of the mouse
- move the mouse along a diagonal line until reaching the point in which you want to end the measurement, and then, in the video, read the distance between the two points, the inclination angle of the straight line and the coordinates of the arrival point
- press the “D” key once more to end the procedure.

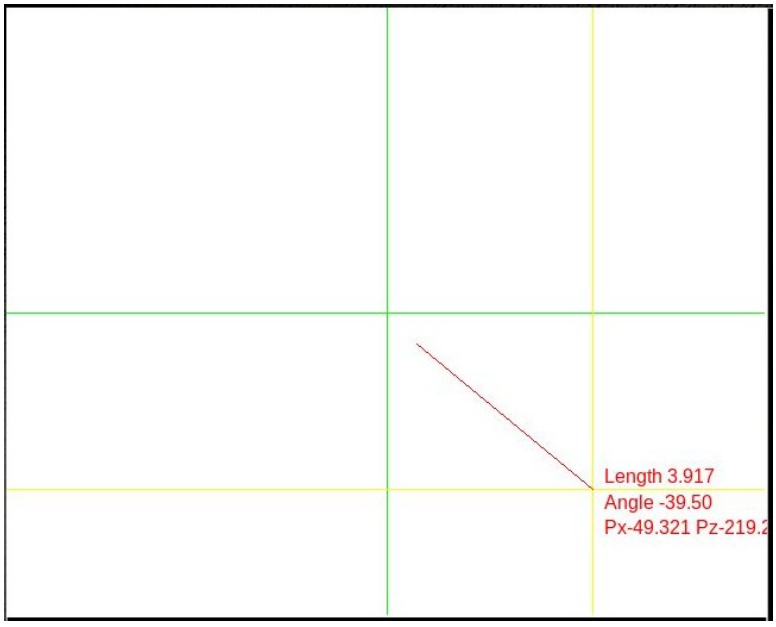


Figure 47: Diagonal graphic measurement

If you press the “C” key on the keyboard, you will be allowed to draw a circumference in the video in order to measure the radiuses;

- place yourself on the point where you want to start the measurement
- keep the left button of the mouse pressed
- move the mouse to draw the circumference that is tangent to the profile you want to measure
- release the left key of the mouse, and then read the coordinates of circumference center and the radius of the same circumference
- press the “C” key once more to end the procedure.

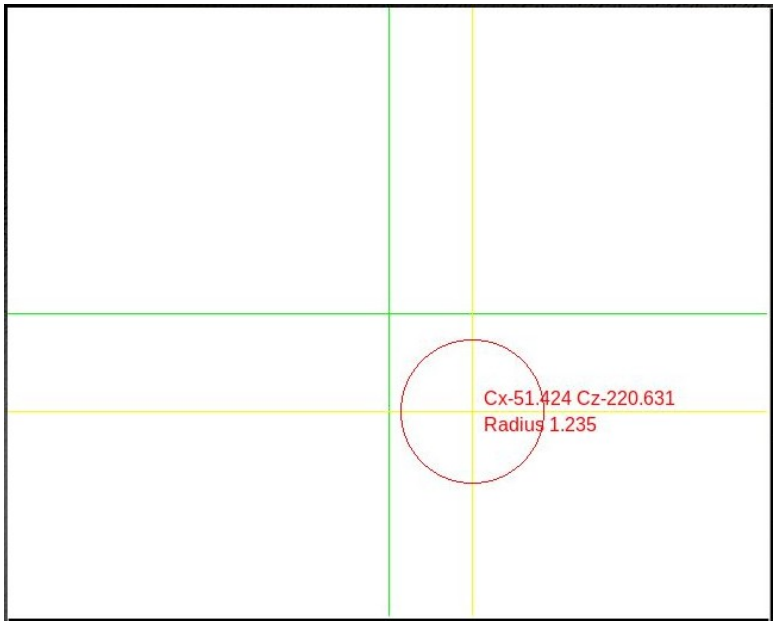


Figure 48: Circular graphic measurement

9.3.6 Automatic Chamfer Measurement

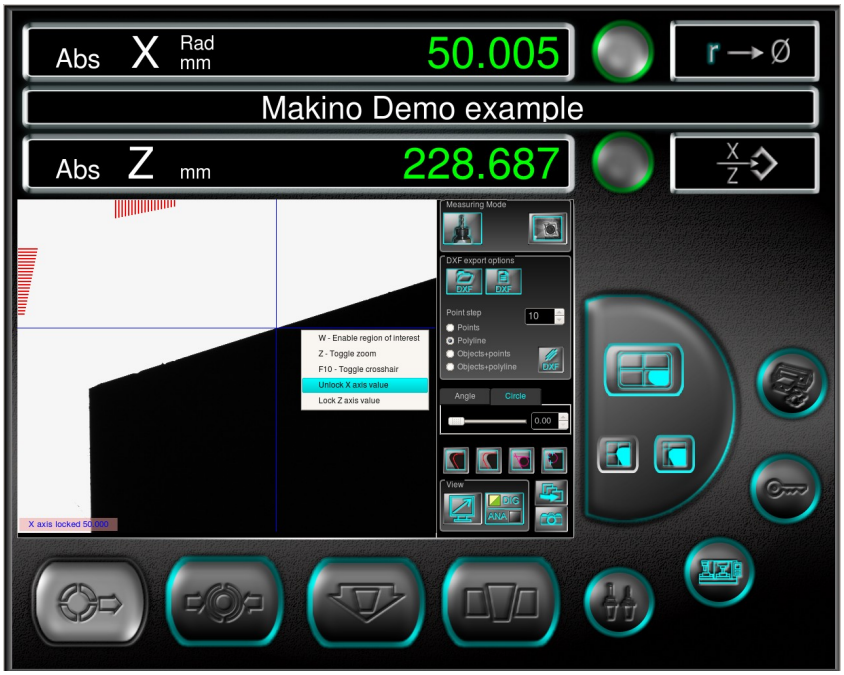


Figure 49: Chamfer measurement

A particular feature of automatic collimation on full screen allow to set a fix position to one of the axis, measuring automatically the value for the other axis.

To activate this feature the auto-targeting must be active, then by clicking the right button of the mouse inside the camera area, it is possible to set the value for the desired axis.
Once this value is set, the auto-targeting function will automatically show the value for the other axis.

☑ *The measurements calculated with this function can not have a precision of less than 10 microns.*

9.3.7 Region of Interest

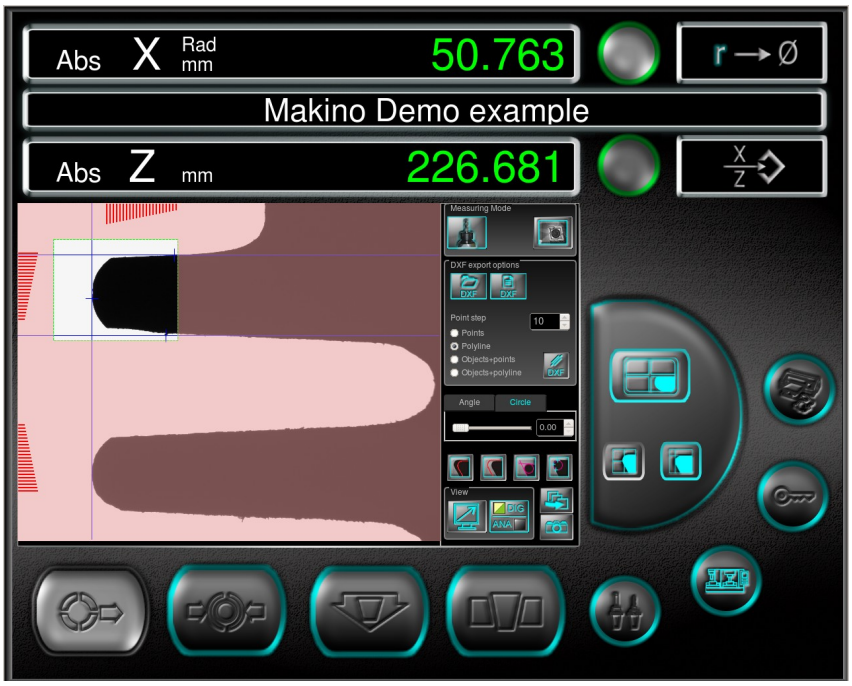


Figure 50: Region of interest

A useful addiction to the function of measurement, either on fixed grid or auto-targeting on full screen, is provided by the possibility of defining a specific area where the software can operate. The working area or ROI (Region Of Interest) can be resized and repositioned at will anywhere on the screen, allowing the software to analyze only that part of the image contained within it.
This makes it possible to drive the measurement of details that otherwise would not be considered; this function is particullary useful in the measurement of very small geometric entities and/or damaged tools, allowing exclusion of not interesting parts.
The possibility of limiting the working area, allows to measure easily shaped tools, or with cutting edges close together without moving the presetter axes.
The ROI can be used with every measurement mode, fixed reticule or auto-targeting, automatic geometrical functions and DXF file genreator.

To activate the ROI, right click on the mouse in the camera system area and then select “region of interest”from the menu.
Once ROI is activated it is possible to move it using the mouse.

9.4 Tool Inspection

As already said, the 106V camera can display the surface of the cutting edge to identify possible irregularities.
Obviously, you can also carry out “manual” measurements of the displayed parts by using circular, angular or fixed reticules.

Instead, the functions concerning the automatic measurement and focusing indication are inhibited;
indeed, they need an image with the highest possible contrast only of the tool profile (diascopic image).

If you activate the inspection mode, the 106V vision system will commute the display by turning off the diascopic light source and turning on the annular episcopic lighting.

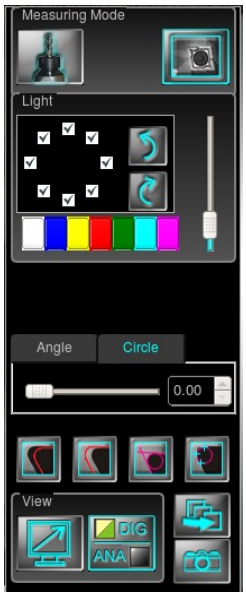
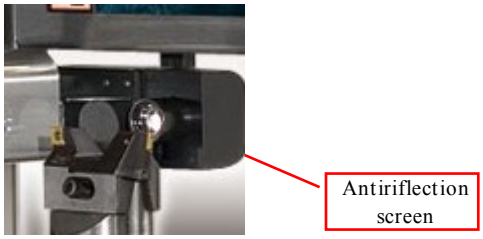


Figure 51: Tool inspection

As you can see in the screen on the side, the measurement functions keep active, while a panel is displayed, which allows managing the tool vision at best.
You can manage the lighting intensity to obtain the correct level of contrast for the framed part. Indeed, the tools are often very reflecting as per their intrinsic nature, therefore it becomes necessary to proportion the quantity of light that is used by slightly rotating the position of the spindle in order to examine the surface.

To carry out this adjustment, there is a potentiometer at your disposal in the control panel or you can manually rotate the handle that is installed on the arms of the 106V vision system.



If the background of the image is too light, you can use the black reflection-free display to cover the lens.

Another option is that you can individually turn on and off the eight LEDs of the annular illuminator: operate the relevant flags or rotate them in clockwise or counter clockwise direction until you find the best lighting conditions to examine the surface of the tool, as shown in the two pictures below.

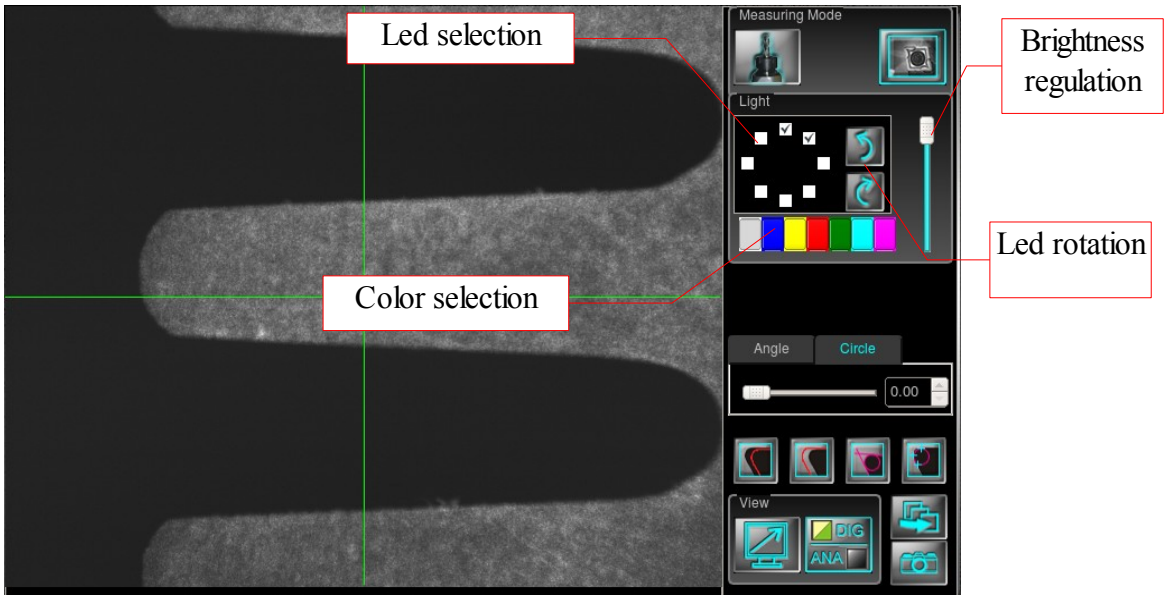


Figure 52: Tool inspection

To make this operation even easier, the 106V camera allows modifying the complementary color for the black in the displayed image: you can select among seven colors, in a way to give even more prominence to possible micro defects in the inspected cutting edge.
To modify the color that is used in the inspection mode, press the relevant key and select the desired color. The following example shows that the green color is active.

As for the inspection tool, too, after having adjusted the brilliance, you can use the full display view in order to better see the surface of the tool.

In inspection mode you can use the measurment function on the screen by pressing F10.

9.5 Photograph of the Tool

When the 106V vision system is operating, you can capture and save the image on the video.

If you press the key, a window will be displayed in which you have to specify the name of the image to be saved.

By pressing this key, you access the folder: /home/elbo/Presetter/snapshot, which contains all saved images.
The format of the saved photographs is .png (portable network graphic).

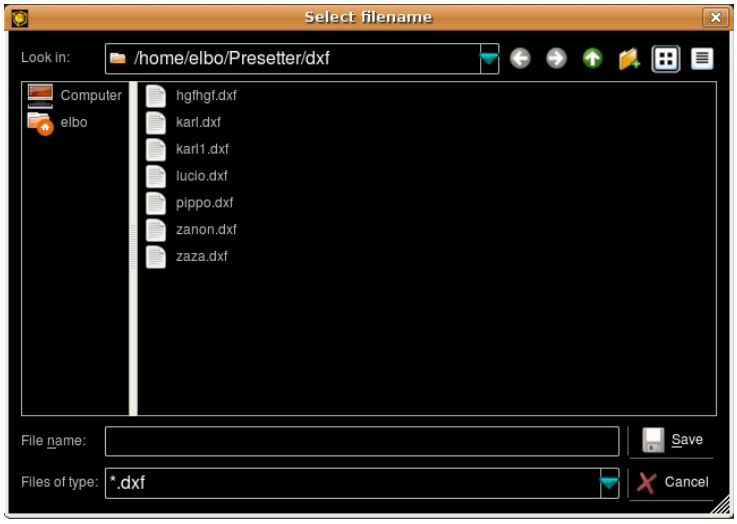
9.6 DXF Files

The camera vision system provides the ability to import drawings in DXF format for their display overlapped to the shadow of the tool , as well as the possibility to extract the geometrical characteristics framed in the camera for a reconstruction of the profile to be saved later as a DXF file.

Figure 53: DXF export options

9.6.1 Creation of a DXF File

Creating a DXF file allows you to reconstruct a tool profile by acquiring subsequentialy deisred parts of it. After pressing the button for creating a DXF file will be asked the name by which you want to save it.



Now, frame the point from which you want to start, and then select the type of line that you want to obtain.

- "Points" will acquire a set of points on the framed profile whose distance one to the other will be established in the "Point step" window and expressed in pixels.
- "Polyline" will draw a continuous line on the framed profile.
- "Object+points", besides the profile by points, will draw all geometric elements that can be detected in the framed picture.
- "Object+polyline", besides the continuous line on the profile, will draw all geometric elements that can be detected in the framed picture.

By pressing the "enter" button will add to current DXF the line type selected surveyd on the current profile.

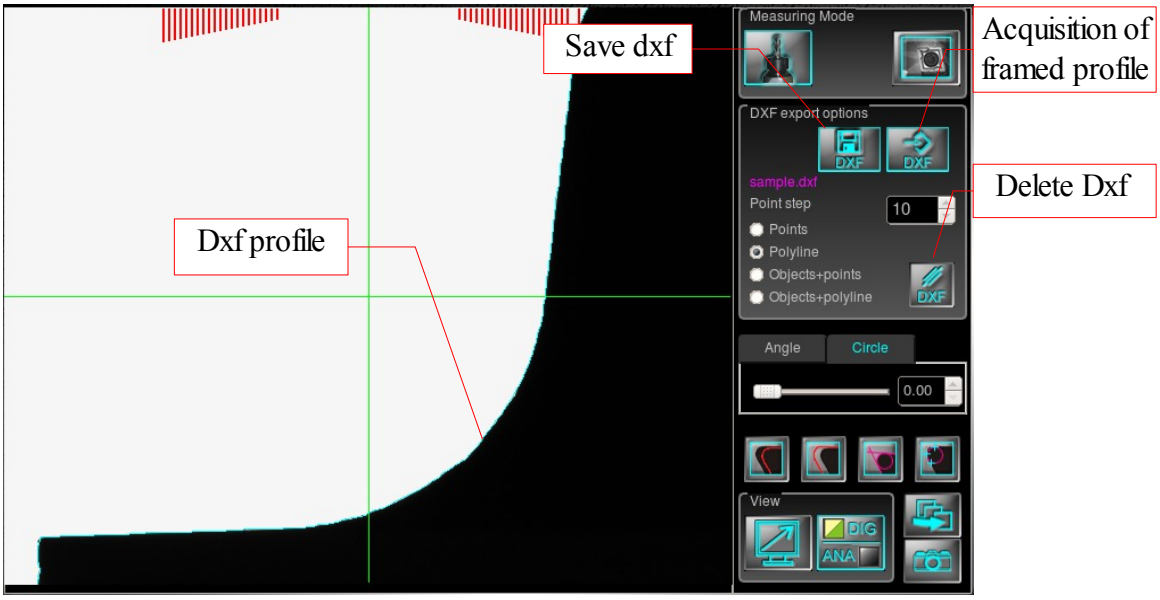
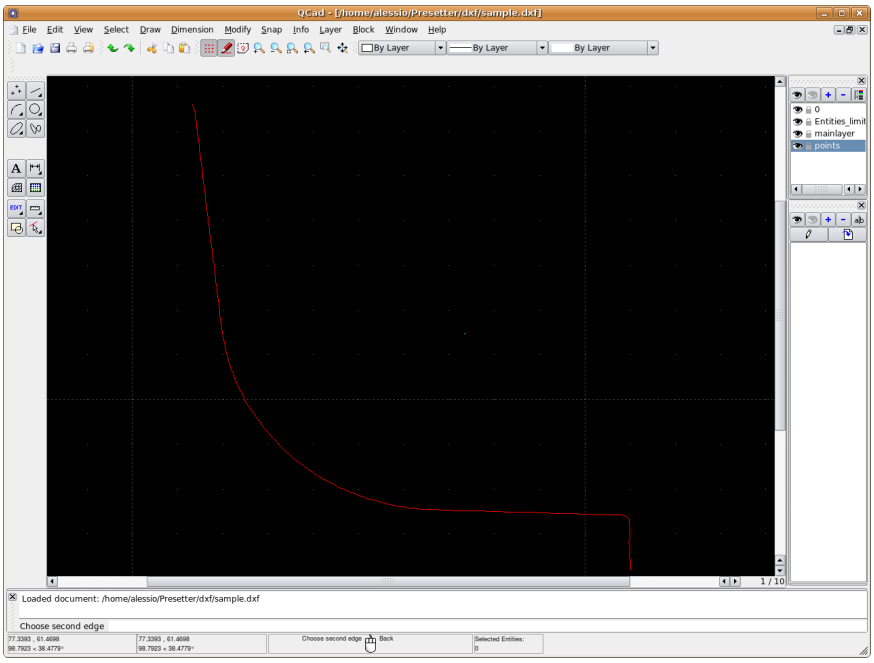


Figure 54: Create DXF

After having acquired the first part of the profile, move and acquire the following parts until completing the desired area.
The acquired profile's parts are visualized in ligt blue.

After having completed the procedure, press the save key; the folder: /home/elbo/Presetter/DXF will include the file, which is ready to be processed by a CAD system (in the following example you can examine the Sample.dxf file).



To acquire the geometric elements, you must enable the relevant function and it is advisable to store the profile to be acquired in order to have a stable image to be processed.

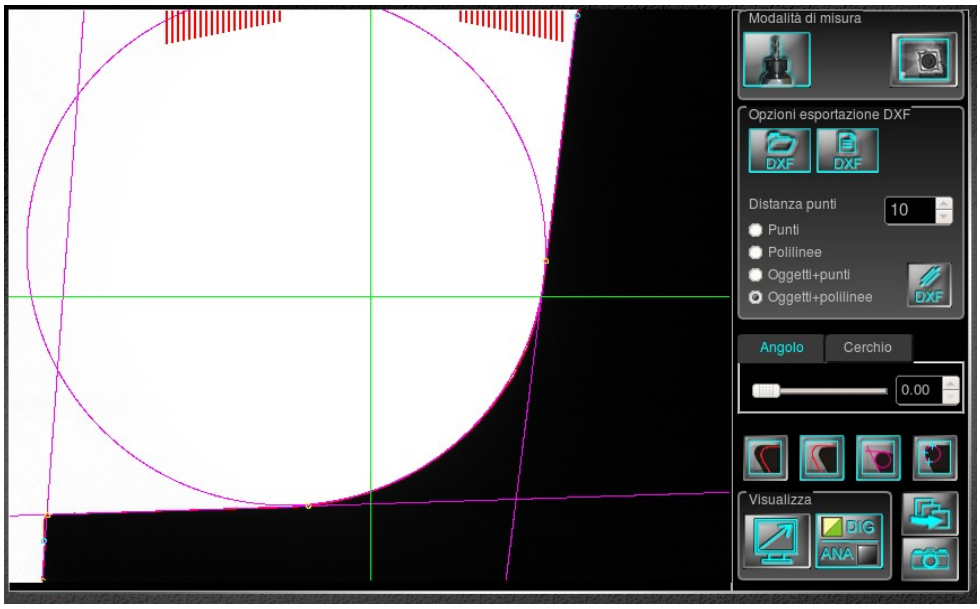
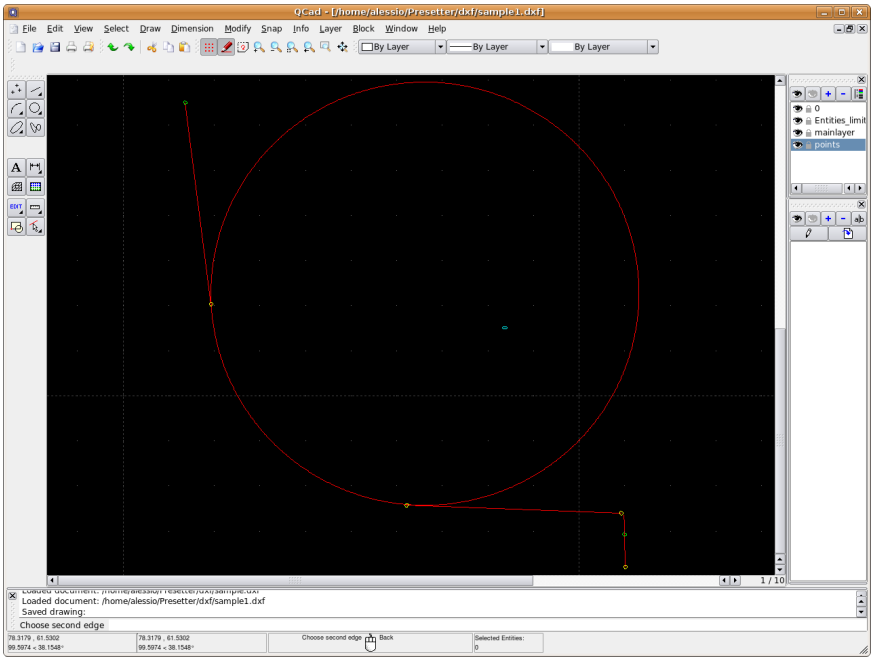


Figure 55: DXF objects export

The resulting DXF file will show all geometric elements (straight lines and circumferences) that were captured during the acquisition of the profile.



9.6.2 How to Import a DXF File

The reverse process provides for the importation of an existing DXF in order to compare the drawn profile with a tool profile.

The import filter is able to recognize the following objects:

- points
- lines
- polylines
- circumference's archs
- circumferences

Any other object in the DXF file is ignored.

Since every DXF drawing has its own coordinate system, this is opened by the system using the machine coordinate system in terms of origins and graphic scale .

Software will ask the name of the file to import, than will show the complete loading and will disply it on the screen.

9.7 DXF Navigator

Each operation on DXF file, creation or import, can be made easier by “DXF navigator” a window that show the DXF status regard the presetter axis position.
Throught this window it is possible to get informations about the absolute position of the DXF and its size.

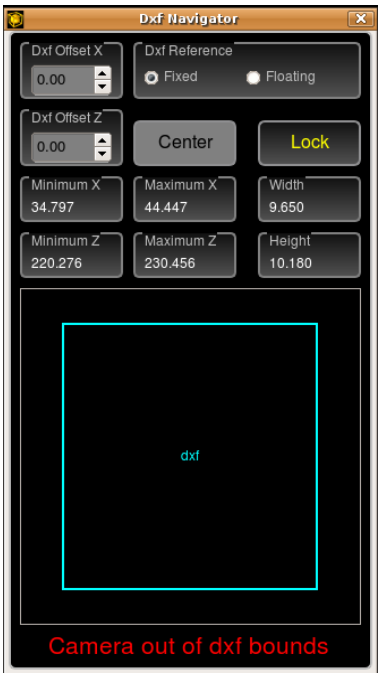


Figure 56: DXF navigator

The white rectangle represent the area framed by the camera while the light blue one is the actual size of the DXF, any movement of the axis will be displayed throught a relative displacement of the two rectangles.

DXF navigator is very useful in case of import of DXF file whose coordinate system is not consistent with the machine's.
After changing the DXF reference from “fixed” to “mobile” using the button “center” you can move the drawing so that it will be centered oin the camera framed area and , later on, it is possible to change its position by modifying the axes offset values.
Another way to modify the axis offset is to use the mouse to drag the camera rectangle within the DXF.

By default the DXF drawing is anchored to the axes so any movement of the axes cause a movement of the DXF profile.

Using the “lock” button shall have the opportunity to make the DXF profile fixed and then indifferent to the axes movement. In this way it is possible to create a static graphic overlay to the cameras it is a fixed reticule that can be centered at customer will.

10 MACHINE ORIGINS

10.1 NC Machine Origins

In case of tool measurement operations, there are no particular problems in the X axis radial measurements, but a conventional reference point must be established for length (Z axis) measurements. When a tool radius or diameter is measured, the zero point will always be located on the tool, though the situation is quite different for length measurements. For this reason, the tool presetter must be reset on the same point for the Z axis of this NC (absolute machine zero point, spindle nose, etc.).
The most simple method is to measure a master gauge or a reference tool directly on the NC machine. The dimension is then transferred to the tool presetter. The radius and length measurements set on the machine will then be shown on the screen .

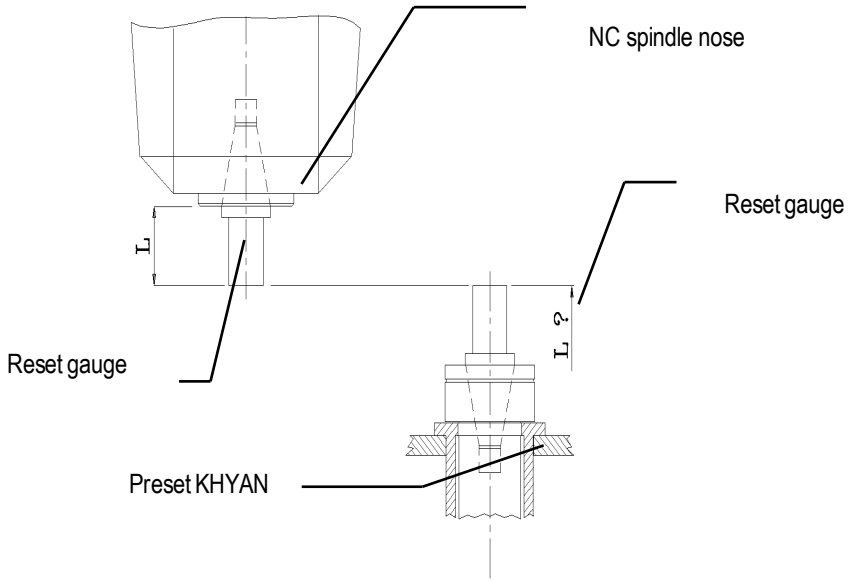


Figure 57: Machine origin concept

A more efficient system is to use the same origin given by the length marked on the reset gauge, for all of the machines having the same spindle intersection.
The electronic equipment 706 gives freedom of choose which system to use in order to express the length on Z axis, and includes in presetter functioning the self learning of the origins for each machine or group of machines according to the system applied.

It is possible to specify for each machine either as radius or as diameter, the unit of measure and also the counting direction or the exchange of the single axes (settings which are particularly useful for measuring lathe tools). All the settings stored for each machine become active simultaneously with the origin shifting, that is every time they are recalled, and thus avoiding any possible error.

10.2 Introduction

The machine origin database will store the information about all machine tools and the relevant numeric controls.
It will allow the Khyan presetter to detect the correct measurement of the tools and to create, by means of Post-Processor, the file of the calibrators to be sent to the same machines.

Therefore, it is absolutely necessary to create an origin for each machine tool that the presetter will serve, by paying attention to enter the correct information asked for by the software.

If you press the key to access the machine origin database, you will open the screen that displays the list of configured machines: during the first access, the list will be empty or there will be a test machine that has been entered for testing the preset.

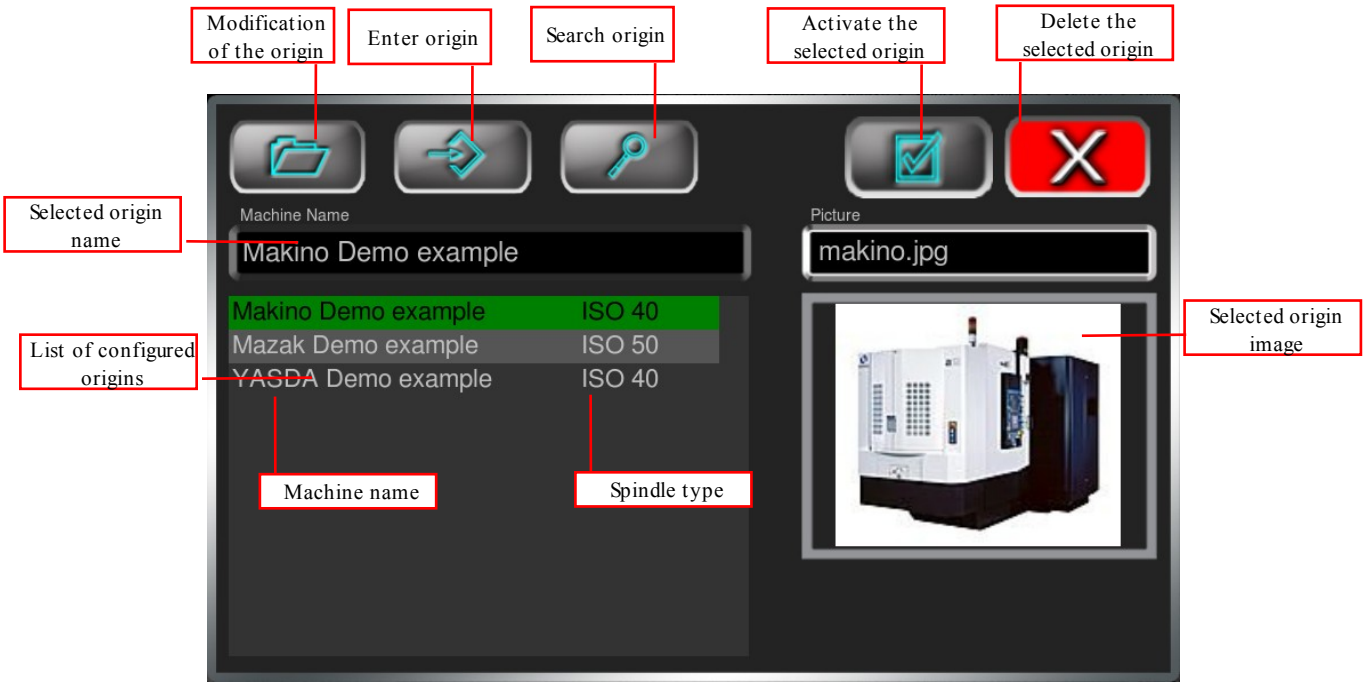
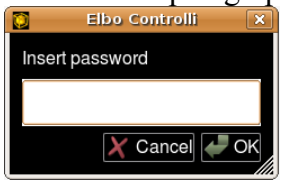


Figure 58: Machine list

10.3 How to Enter/Modify a Machine Origin

☒ *Procedura di inserimento origini macchina*

To start the machine origin entering procedure, you must press the **Enter Origin** key and type in the required password (remember that the default password is **elbo**, unless it was modified in the machine parameters – see paragraph 8.2.2).



The screen below will be displayed and it will include some fields that are absolutely necessary for the correct identification of the machine (in green-colored boxes) and others that sometimes can be empty (in the orange-colored box).
They will be individually examined below in order to understand their meaning and the way to fill them in.

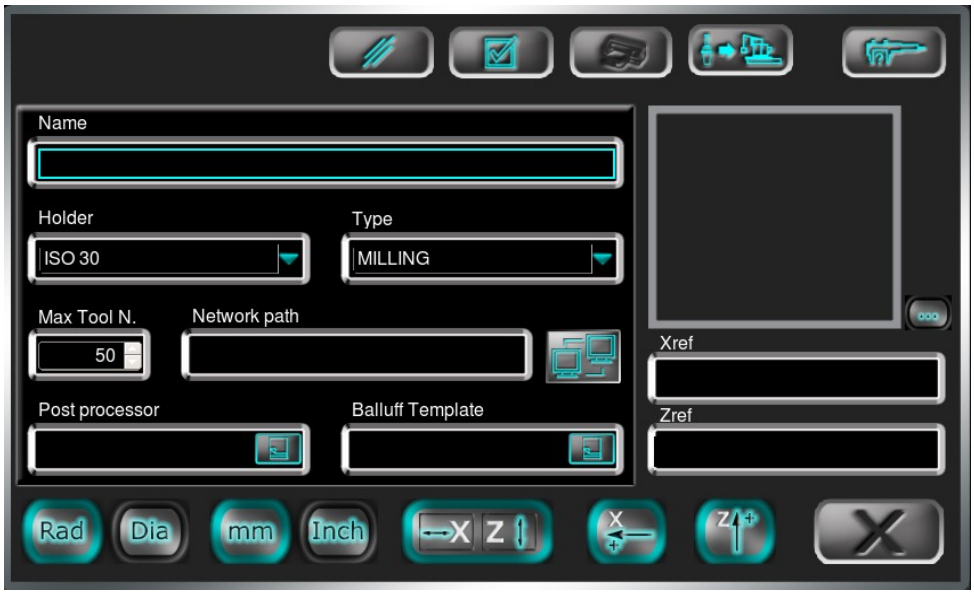
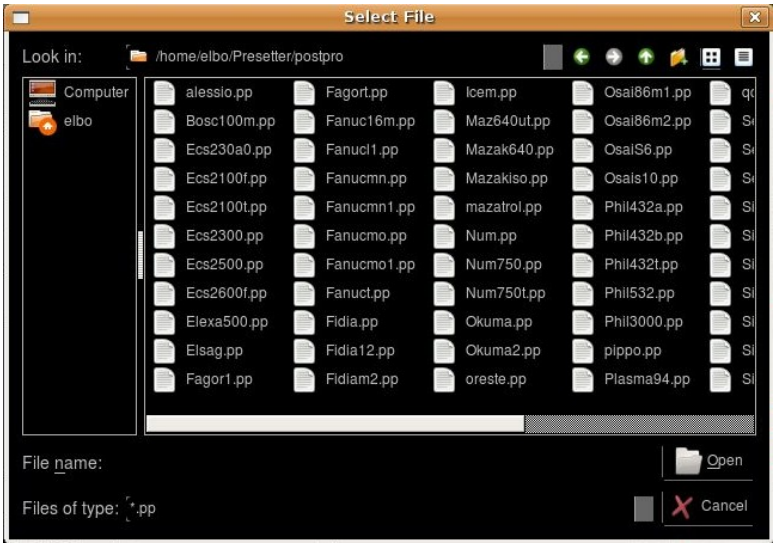


Figure 59: New machine input

- In the **Name** field, enter a name that will be used to unequivocally identify the machine origin; indeed, two machine origins with the same name will not be accepted. The software will look for a jpeg image having the same name of the machine in the folder: /home/elbo/Presetter/pictures; if there is one, the machine photograph will be displayed in the record. If the software does not find any correspondence between the name and an image file, it will display the image of a milling machine or a lathe, according to the definition of the type of machine in the **type** field.
- In the **Holder** field, by means of the drop-down menu that was previously filled in the machine configuration area (par. 8.2.2), select the type of spindle connection.
- In the **Type** field, again by using the drop-down menu that was previously filled in the machine configuration area (par. 8.2.2), select the type of machine tool.
- In the **Max Tool No.** field, enter the maximum number of tool calibrators accepted by the tool table of the CNC; it will be the maximum number of tools that can be entered into a Set being associated to this origin.
-  If the machine is connected to a corporate network, press the **Browse directories** key, and then select the shared folder that will include the saved files, which were created by means of Post-processor. This path will be displayed in the **Network path** field.

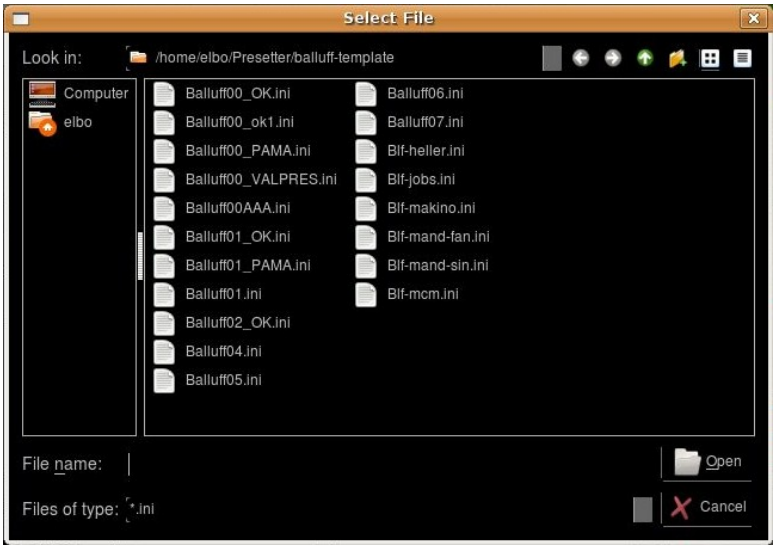
-

- If you want to associate a Post processor format to the machine origin, press the **Browse Post processors** key and look for the same numeric control that is equipped in the machine tool.



If it is not present, select a similar one, which can be already compatible with the CNC being considered or, at worst, it will be used as a base to be modified with the GUPP (Post Processor Universal Generator), as described in chapter 13. The name of the selected file will be displayed in the **Post processor** field.

- If the machine tool, and thus the presetter Khyan are equipped with a manual reading/writing system for the recognition of Balluff magnetic chips, press the **Browse Balluff Template** key and select the format in which tool data will be read and written in the chips.



The name of the selected file will be displayed in the **Balluff Template** field.

☑ *Post Processor and Balluff functionalities are mutually exclusive.*

Define if the measurement of the X axis will have to be in radius or in diameter.

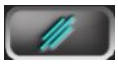
Define if the pre-arranged unit of measurement for this origin is millimeters or inches.

Assign the letter that will define the vertical and horizontal axes that are set when the machine origin is activated.

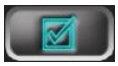
Assign the counting direction set for the axes when the machine origin is activated (this setting is useful for the measurement of special tools or lathe).

The following description concerns the keys for this area and the relevant functions.

They allow moving inside the database to pass from a machine origin to another without going back to the previous menu.

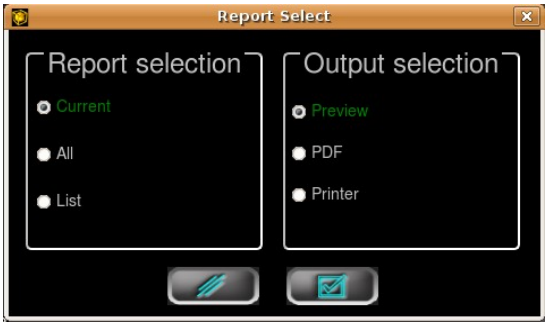


It goes back to the machine origin menu.



It saves the configuration and activates the machine origin.

It accesses the menu to print the machine origins and allows selecting the type of report that you want to obtain, as well as the printing mode.



The print reports are in the folder: /home/elbo/Presetter/Reports and can be modified by the final user by using free software (NcReport) that can be downloaded from the web address: http://www.nocisoft.com/?id=down.
The name of the report has not to be modified, otherwise the software cannot localise it anymore.

Elbo Controlli cannot be held responsible if this program is used in an improper way, thus making the report unusable.

It accesses the page of the Post-Processor generator (GUPP).
In this area the final user can display the preview of the file that will be generated by post-processing a tool set; it allows checking the compatibility with the specifications of the numeric control and, if there is no compatibility, you can modify the structure of the data.
Indeed, the upper window (NC post-processor) shows the structure of the file that will be generated and it can be edited by the user, while the lower window can display the resulting file.

It is advisable to make a copy of the post-processor, so the original files supplied with the program can always be used.

It opens the procedure for the measurement of the machine origin that is described below and provides for two operating modes: manual acquisition or importing from the "Factory X" parameter.

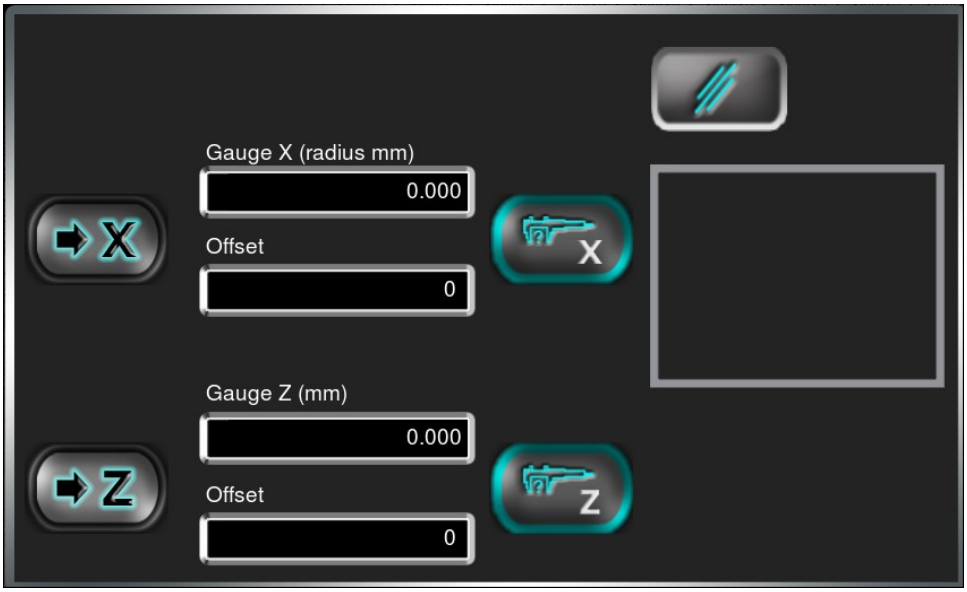


Figure 60: Machine origin measurement

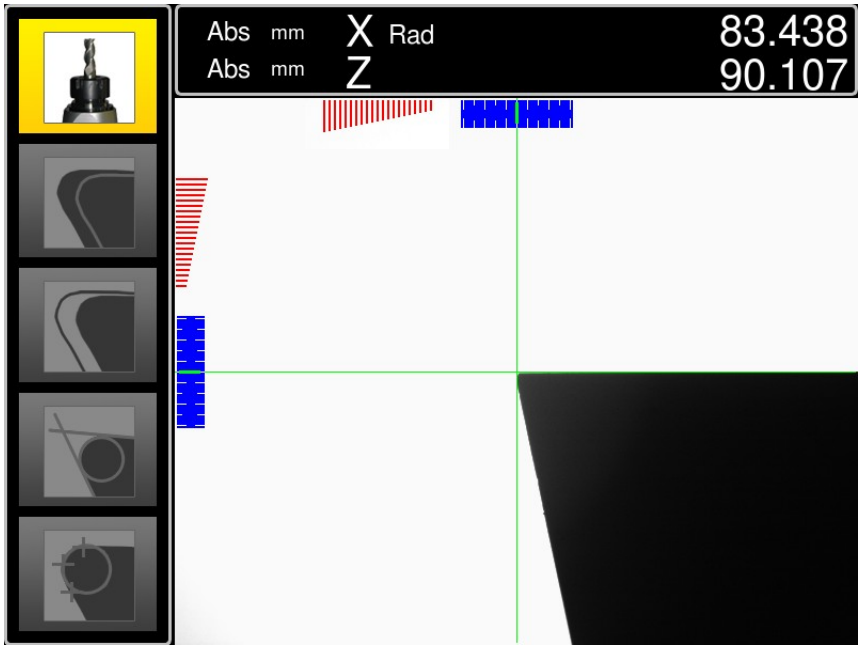
The "Factory X" parameter is set during machine testing by using a certified zero setting gauge; if you press the X and Z keys, the dimensions will be set as a reference for the machine origin. Obviously, while the reference for the X axis is the spindle axis, the dimension concerning the Z axis may vary from machine to machine; therefore, it is advisable to perform the manual acquisition.

If you want to carry out the measurement procedure, you must have a reference tool that has been measured in the machine; after that, press the X and Z keys to activate the relevant screens, which will guide the user for the acquisition of the origins that are described below.

☑ *You can also use a mixed system with "Factory X" for one axis and manual measurement for the other.*

Introduce the tool into the spindle holder taper, and then clamp it (recommended!) as described in paragraph 3.2.4; enter the dimensions relating to the radius and the height of the reference tool in the specific boxes. After that, press the key concerning the axis to be measured.
In the display of the vision system that is installed in the machine, frame the tool as shown in the picture below by taking it close to the center of the display; after that, rotate it until achieving the best level of image focusing, and then the point of maximum tangency.

The operation will be made easier by means of the light-blue focusing bars that are clearly visible for the two axes and by the blue-colored digital comparators, which will be displayed when the axis is almost in tangency with the fixed reticule.



According to the axis that has been selected, the screen will ask to go into collimation with the fixed reticule.

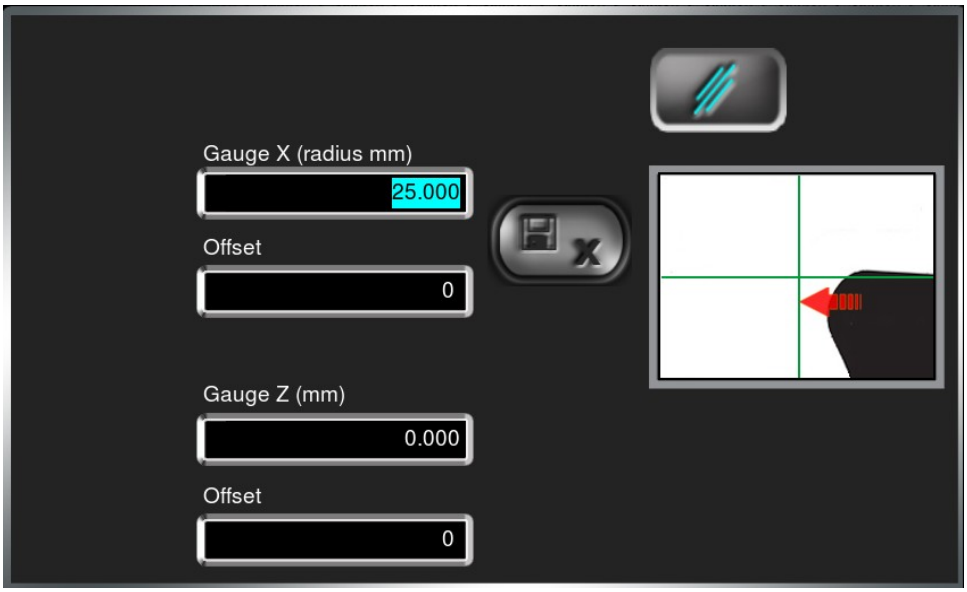


Figure 61: Machine origin measurement 2

The operation will be facilitated by the blue digital comparator that appears when the axis is almost tangent to the reticule and took the green pointer reference that indicates precisely the exact position of contact with the reticule.

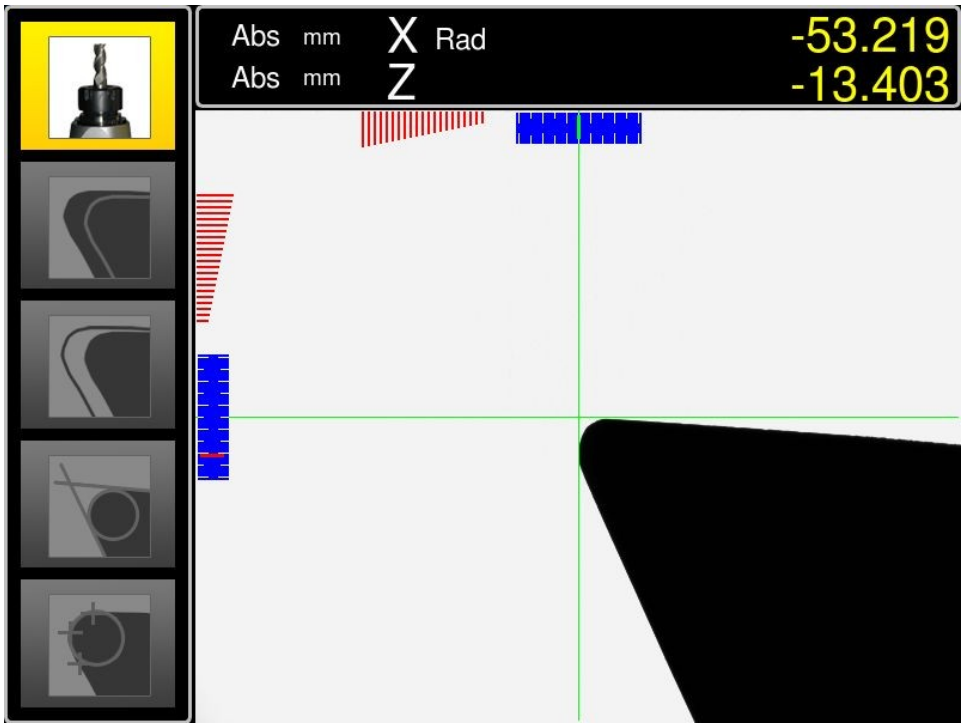


Figure 62: X origin collimation

When reaching the position of contact with the fixed grid (comparator to zero pointer green), will enable the validation button. Press to save the reference value on the X axis.

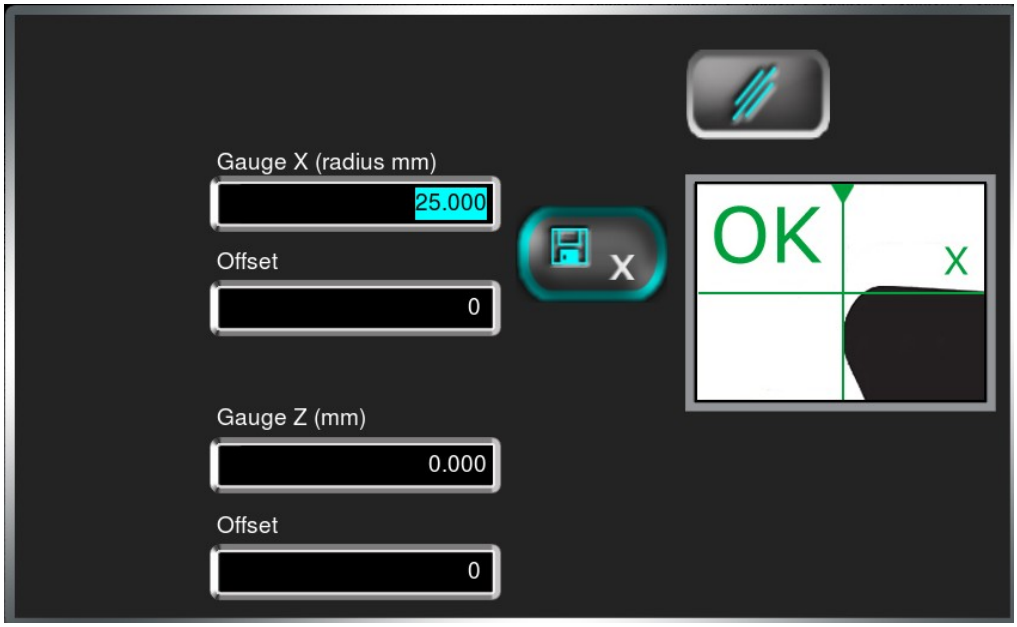
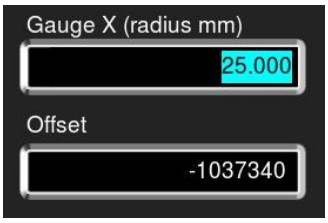
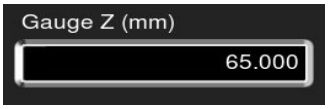


Figure 63: X origin measurement confirmation



The validation of the measure, will be highlighted by the automatic compilation of the field "Reference" .
Start now with the same procedure for the Z axis .
Fill in the box relative to the length of the reference master gauge .



Press the button for the measurement of the Z axis reference.
The following window will be displayed

Move the Z axis to bring the tool shape in the collimation with fixed reticule.
The operation will be facilitated by the blue digital comparator that appears when the axis is almost tangent to the reticule and took the green pointer reference that indicates precisely the exact position of contact with the reticule.

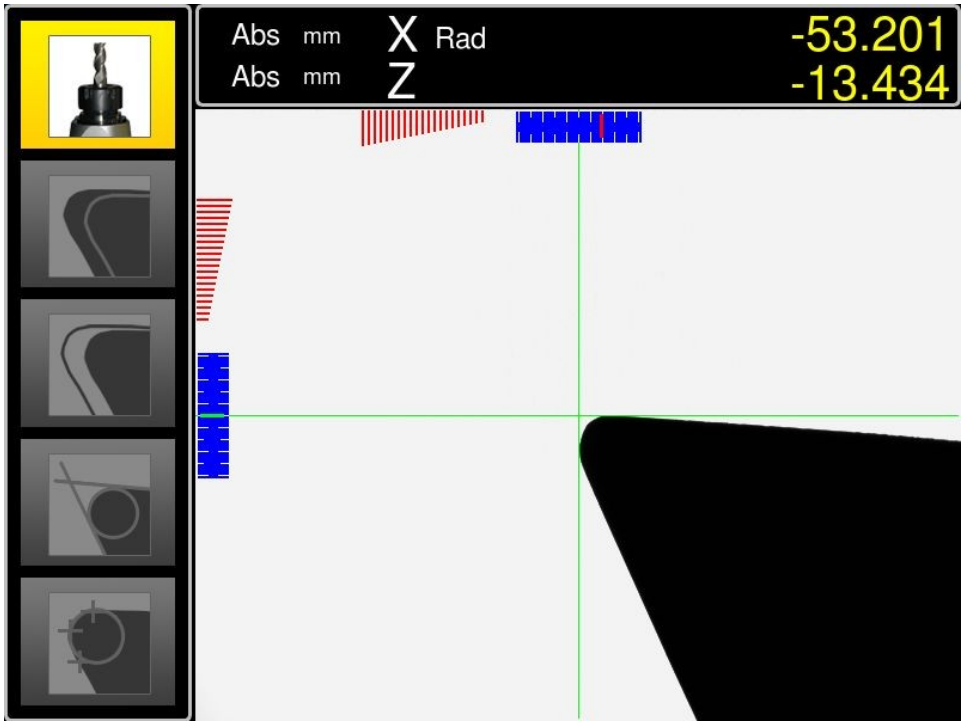


Figure 64: Z origin collimation

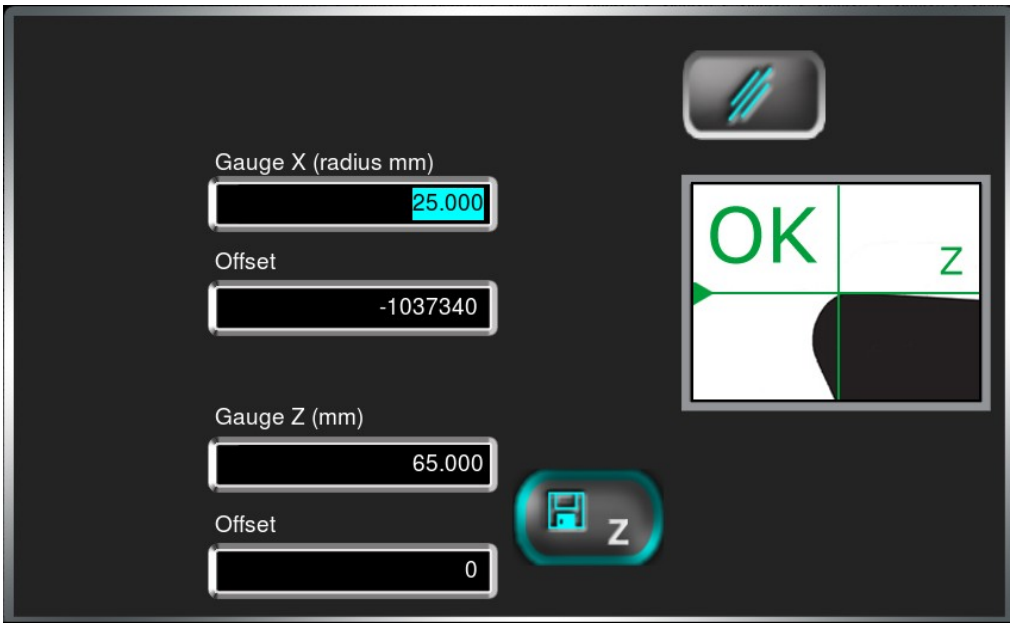
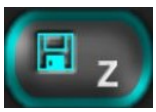


Figure 65: Z origin measurement confirmation



When reaching the position of contact with the fixed grid (comparator to zero pointer green), will enable the validation button. Press to save the reference value on the Z axis.

The procedure is finished, the acquired values are now available and can be used as default values in creating the original machine .


If both origins have been acquired, the system will allow us to save them and go back to the machine editing window.

10.4 Machine Modification

The list will include all the machines that have been entered; by pressing the edit key and type the password, it is possble to enter the selected machnine order to perform any modification or repeat the zero setting precedure, if necessary.

10.5 Machine search

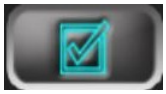
If there are many machines, you can make use of a search function that will aid in finding the desired machine by using the following parameters: name of the machine, type of the machine tool and/or type of the sindle connection.
Pressing the search button will open the below screen where we will enter our search parameters ;

Figure 66: Machine search

It is possible to partially fill the various fields, in any case, the machines will be filtered using a search criterion that meets the values .
In the following window the search result is shown, every machine that begin with “maz” is displayed.

Figure 67: Machine search 2

10.5.1 How to Activate a Machine Origin



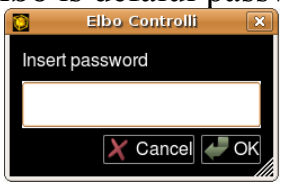
The activation operation can be carried out by pressing the relevant key in the machine list page (the selected origin will be activated) or in the machine configuration page.

10.6 How to Delete a Machine Origin

You can delete a machine origin that was previously entered, but you need to pay great attention, as it will also imply the deletion of all tool sets that are associated with that specific machine.

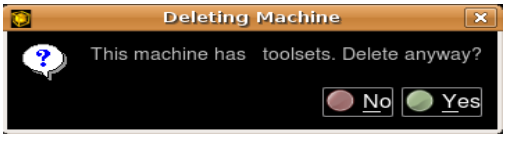
The erase operation can be performed by pressing the button on the machine's list (the selected machine will be deleted), or directly from the machine configuration window.

First it will be asked to insert password (**elbo** is defalul password).



Then it will be asked to confirm the machine cancellation.
In case of a positive answer and if there isn't any Tool Set associated to it, this will be deleted.

In case of a positive answerand if there is any Tool Set associated to it, a new request will be shown in oder to delete also the Tool Set connecte to this machine.



11 TOOL SET

The Tool Set database includes the information about all tool sets that were created; each tool set will be associated with a machine origin (the one in which the tools are used) and will include a quantity of tools that can vary according to processing; however, it can never exceed the number that is defined in the same machine origin.

If you press the key to access the Tool Set page, you will have two possibilities: if you have not selected any machine origin yet, you will see the list with all filed Sets; if you have an active machine origin (in the example, "makino"), you will only see the Sets that are associated with the same origin.

N.B. *A Tool Set is compulsorily assigned to a machine origin; if no origin has been activated, the introduction key will be deactivated.*

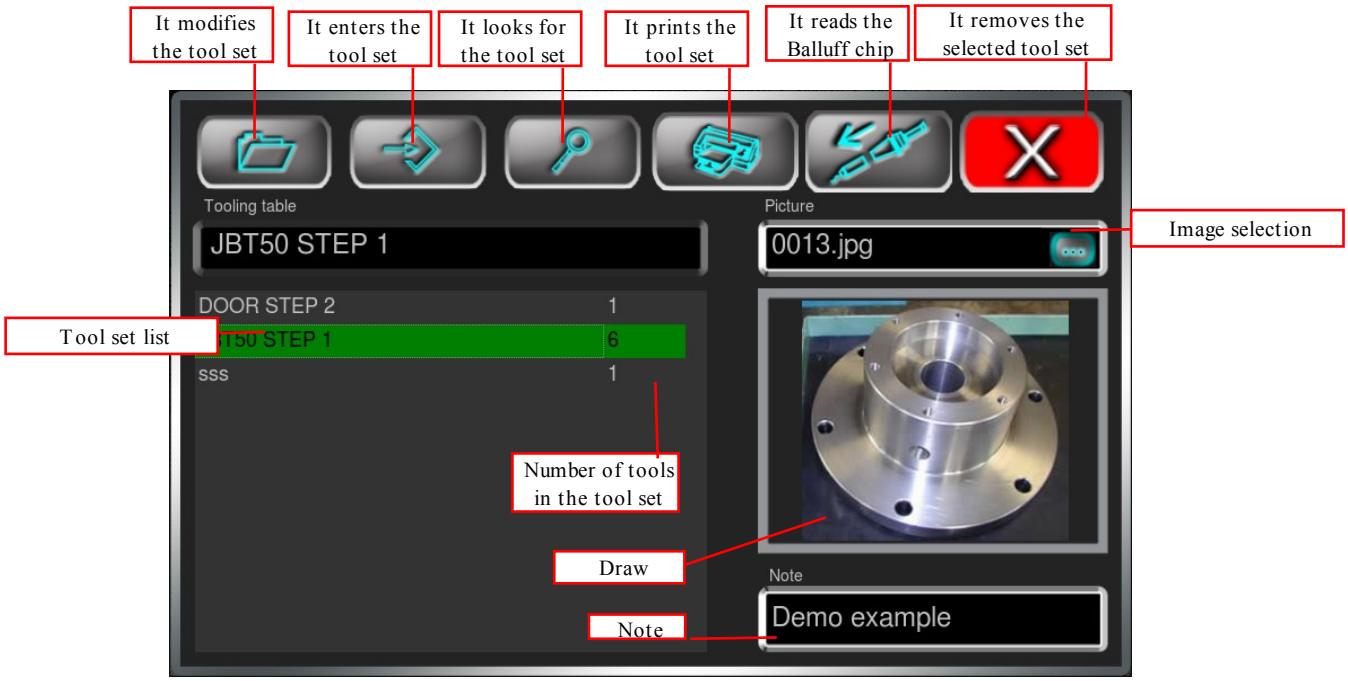


Figure 68: Tool set list

The first pieces of information that are immediately available for each set are: the number of tools forming it, an image (that may be the processing to be carried out), if it was associated, and a note field that may include a brief description about the set.

11.1 How to Enter/Modify a Tool Set

☒ *Tool set input procedure*

To start a tool set entering procedure, press the key **Enter Tool Set**.
As you can see, the operating keys are similar to the ones that are used for machine origins and, in this case too, at the first start of the machine the list will be empty.
Before entering a new Tool Set, it is absolutely necessary to make sure that you selected the correct machine origin.

Figure 69: Tool modification

The single field that is absolutely necessary to enter a tool is the **Tool No.** calibrator number, so you can choose to enter all calibrators and then fill in the fields and measurement.
La scheda utensile può essere suddivisa in due parti, una relativa a tutte le informazioni relative all'utensile (univoca per ogni utensile) e l'altra relativa ai dati del tagliente.

For each tool you can define 1 to "n" cutting edges, and you can print a report that displays minimum and maximum values in X and Z, as well as the difference between the two values (delta).
As for the tool area, you can enter the following fields (all of them are optional):

- **Type** defines the type of the tool by means of the drop-down menu that has been previously filled in the machine configuration area.
- **Code** is the code assigned to the tool and can correspond to the manufacturer's or to the one that is assigned by means of corporate codification; this field, as you will see, can be extremely useful to perform the searches in the database.
- **Dxf theoretical and Dxf real** are the names of the DXF files that, in case, are associated with the tool. (expected for future developments)
- **Life** defines the residual life of the tool, if it is managed.
- **F** is the parameter for the cutting speed of the tool.
- **S** is the spindle rotation speed.
- **Picture** is an image that can be associated with the tool, and it can be selected in the folder:

/home/elbo/Presetter/pictures by pressing the X  key. .

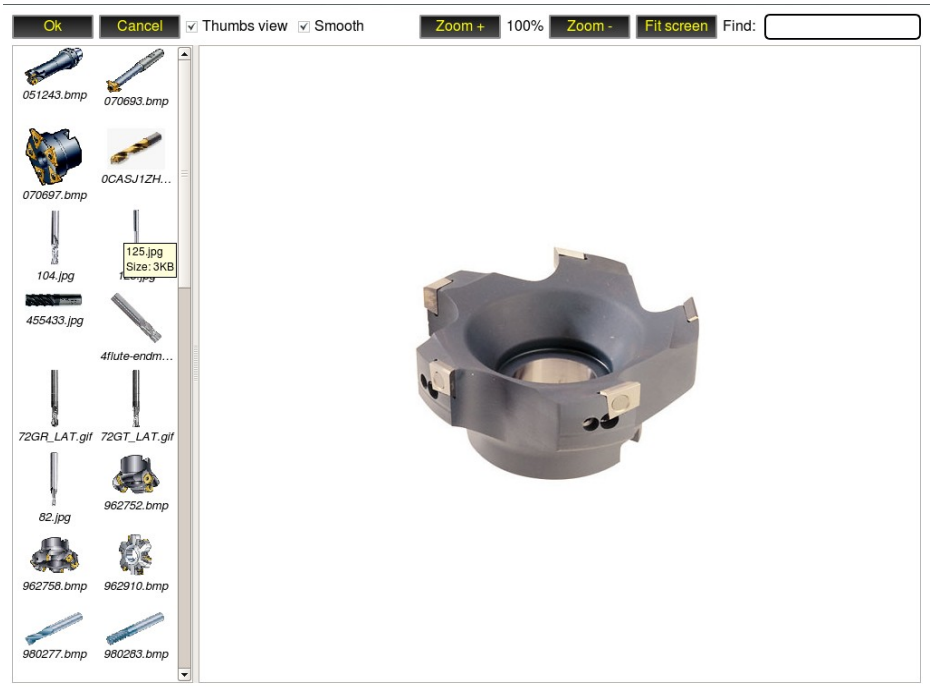


Figure 70: Picture selection

The picture selection window allow to displaythe available pictures as alphabetical list or as icons. The selection of an picture from the list displays the preview wkth the possibility to resize it.
It is available a research field based on the file mane.
The supported picture formats are BMP, JPG, PNG.

Instead, the area concerning the cutting edges are provided with:

- **X and Z** define the measurements of the cutting edge
- **X theoretical and Z theoretical** where you can enter the theoretical measurement of the cutting edge
- **Tolerance X+/X-/Z+/Z-** represent the values of tolerance
- **Notes** shows the notes concerning the individual cutting edge
- **Orient** defines possible spindle orientations.
- **Diameter** shows the diameter of the measured cutting edge.
- **Corner radius** is the radius of the insert .
- **Angle 1 and Angle 2** allow automatically identifying and calculating the inclination of two straight lines that are to be found on the framed profile and display the coordinates of their intersection point.

and the **Delta angle** field that is automatically calculated by the software and it is the angle included between the two above-mentioned straight lines.

11.1.1 Tolerances

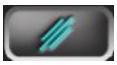
For each cutting edge it is possible to define the theoretical value and both positive and negative tolerances. The tolerance values must be expressed as positive numbers, the program will verify that the acquired valu is in tolerance otherwise will notify a warning message. In any case the user can decide to acept a value even if it is out of tolerance.
The tolerance test is executed only if both the theoretical value and tolerances values are inserted.
In case of multicutters tolerance is defined for the first cutter and it is valid for the followings.

11.2 Function Keys

The following function keys characterise this operating mode .

They allow moving within the database to pass from one tool to another.

It shows the active tool number and the total of tools included in the Set.



It goes back to the Tool Set.

Search tool set
through this button you can activate a quick search window within the current tool table:

Figure 71: Tool search

To move to a desired tool it is enought to double clikc it on the list,you can also sort the list by tool number, type, code.
Filtering the list it is possible by a partial criteria that means that if in the “Type” field you digit “T” only the tools that have that field that starts with “T” would be shown, if you digit “Ti” only the tools that starts with “Ti” would be shown .
When finished with the search the window needs to be closed in order to be able to move forward.

If you use the post-processor that is specified in the machine origin, it will generate a file to be sent to the numeric control and including the entire Tool Set.

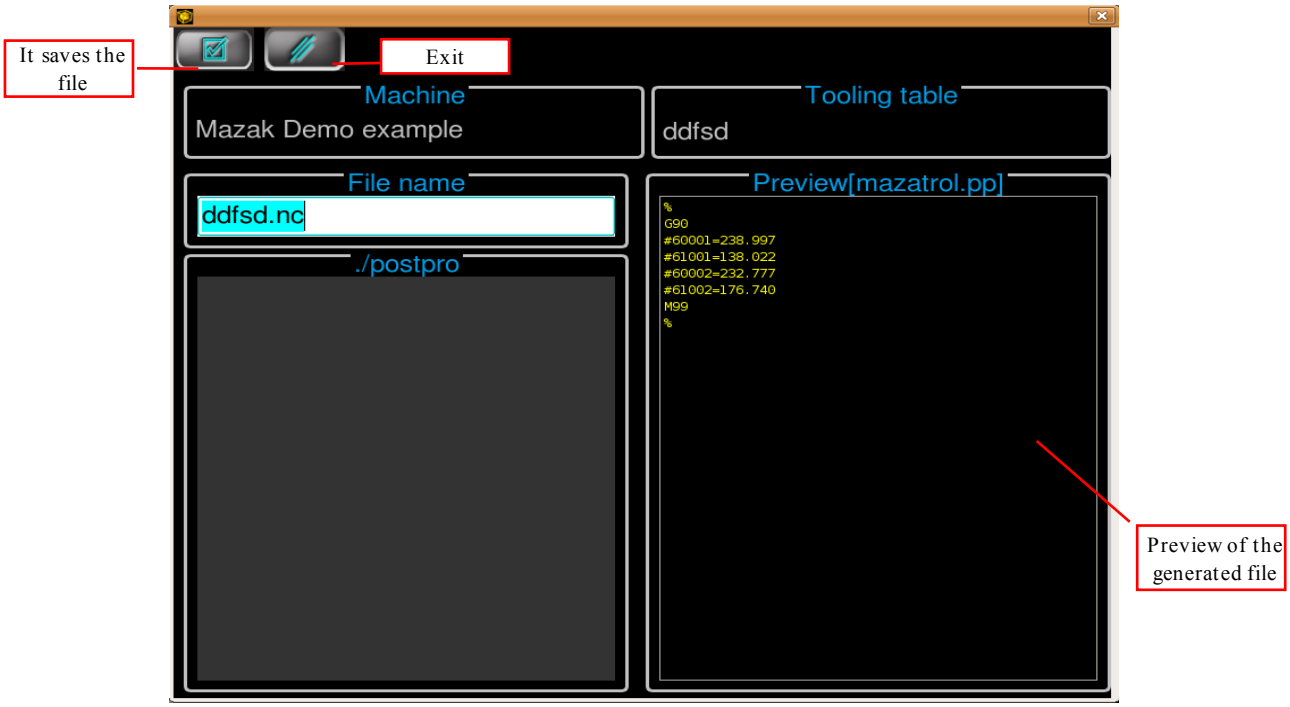


Figure 72: Post-processor data file creation

After this operation, the dimensions of the cutting edges for all tools included in the set will become and keep red colored until the cutting edge is measured again.
If you perform following post-processor operations, it allows including only the tools with varied dimensions into the file.

It accesses the print menu of the tools to select the type of report you want to obtain, as well as the print modes.

If "preview" is selected, printing will be shown in a preview window:

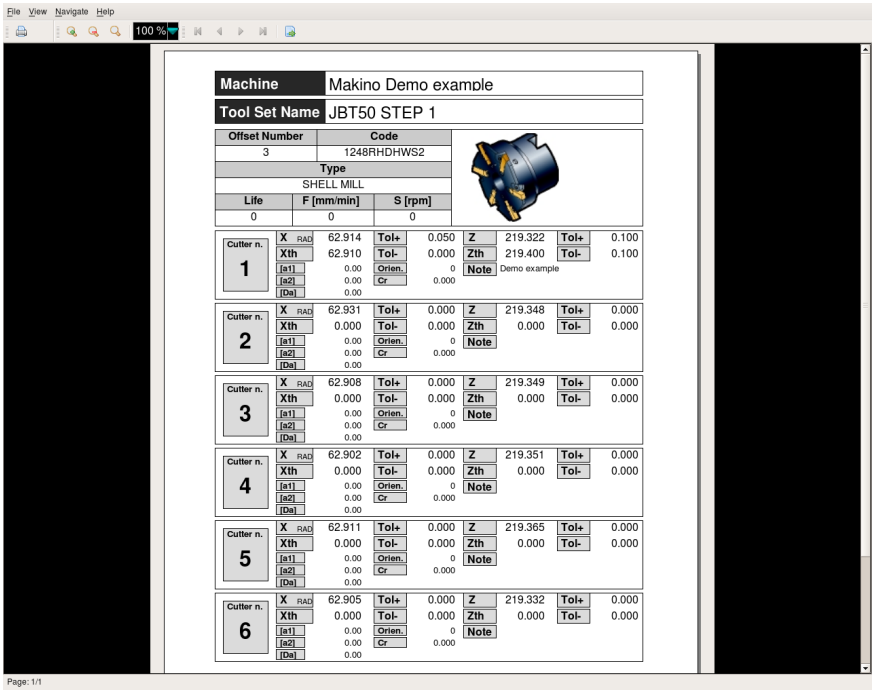


Figure 73: Tool page print preview

printing reports are in th folder /home/elbo/Presetter/Reports and can be modified using a free software (NcReport) downloadable on the web address http://www.nocisoft.com/?id=down.
Report name can't be mdified, otherwise the software won't be able to localize it.
Elbo Controlli is not responsible in the event of misuse of this program, which could make reports unusable.


It allows entering a new tool into the Set.

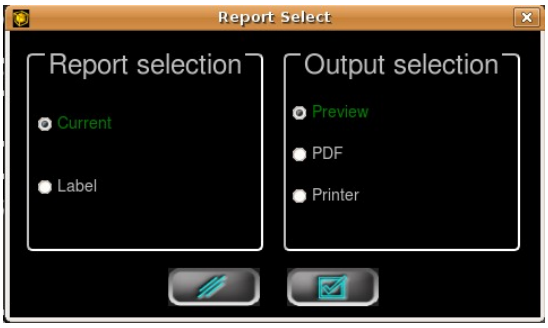

It allows deleting a tool, as well as all cutting edges that are associated with it.

Instead, the area concerning the cutting edge includes the following function keys:

After having performed the measurement of the cutting edge, these keys will save the relevant dimensions.


It enters a new cutting edge for the selected tool.


It accesses the print menu concerning multi-cutting edge tools.



You can print the report of all cutting edges that form the tool by stressing minimum and maximum measurements in X and Z, and a field that specifies the maximum delta between the two measurements, or a label with the two higher values and the maximum delta between the cutting edges.

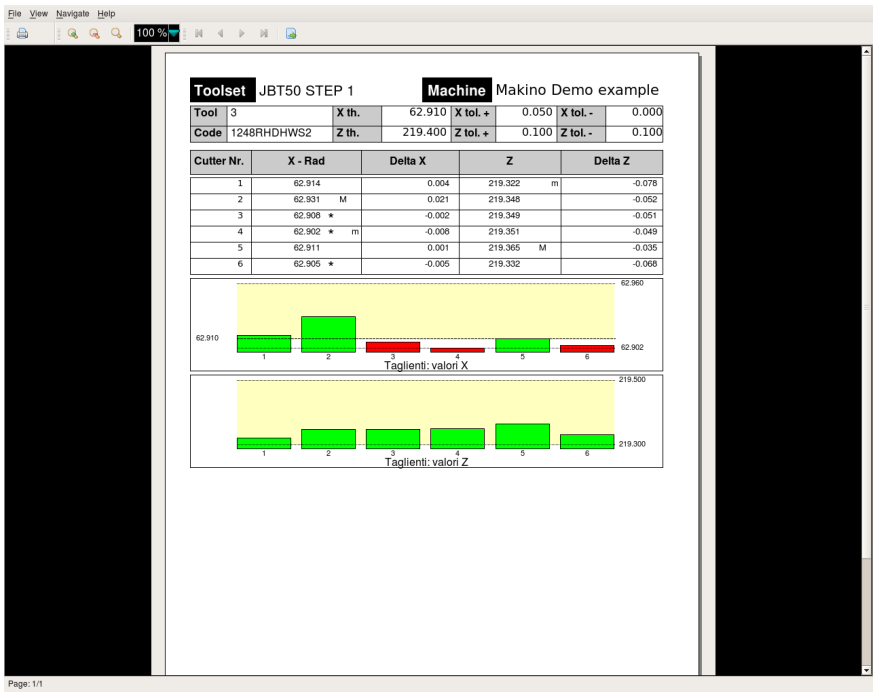


Figure 74: multicutter print preview

Multicutter reports show two graphs representing the status of the cutters related to the set tolerances . A green band indicate in-tolerance values, a red band indicate the values outside the tolerance.
If no tolerance values are set the graph will show all the cutting edges in yellow, showing the highest and the lowest in blue.

By using these keys, you can scroll the cutting edges of a tool.

It allows deleting a cutting edge.

11.3 Magnetic Chip Data Writting

If a Balluff format is defined in the machine, the function menu will have the relevant icon instead of the Post Processor icon.

After having entered all data concerning the tool and performed the measurement, press the key to start the procedure for data writing on the magnetic chip.
The following screen will be displayed and it will be different according to the selected configuration, which will display the fields and the relevant values that will be written on the chip.

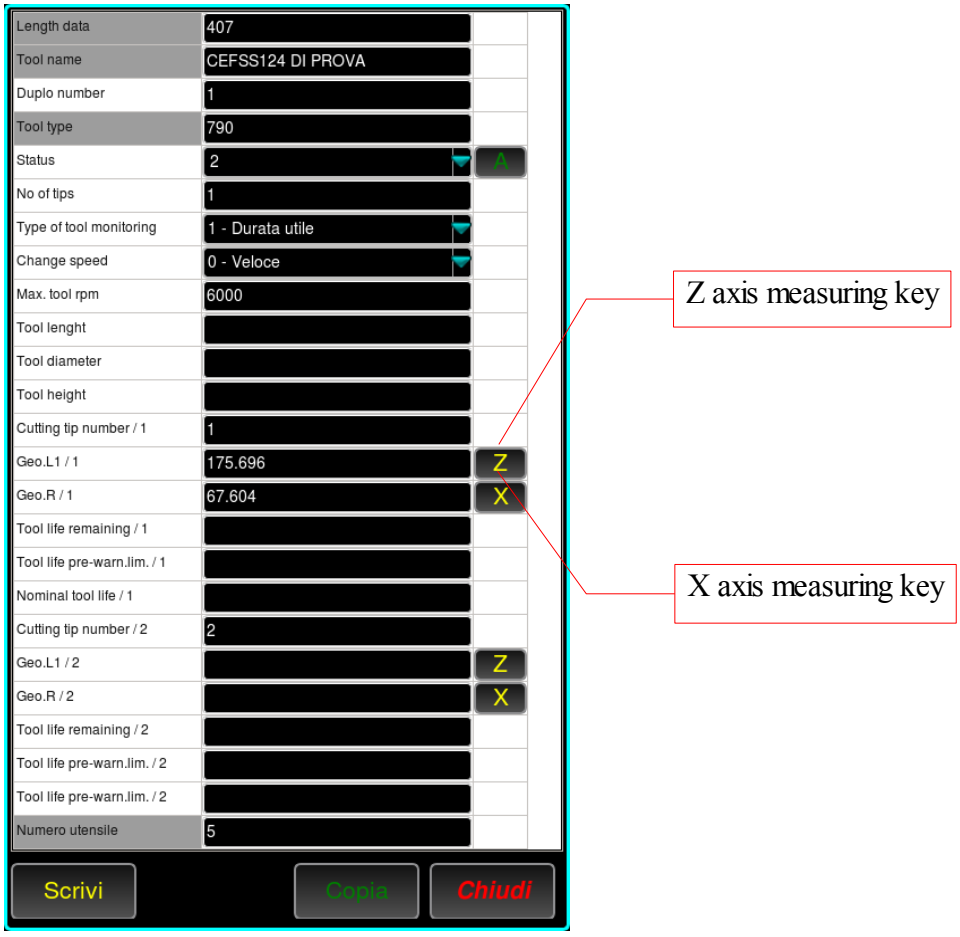


Figure 75: Magnetic chip writting

If you press “Close”, you will exit the procedure; if you press “Write” and approach the chip to the reading/writing head, the data will be transferred to the magnetic chip.

Bring the toolholder close to the reading-head, the software will check if the toolholder you need to write corresponds with the data in the archive. If the toolholder code does not correspond this warning would be show:

user can decide whether to ignore the warning and proceed with overwritting the data or cancel the operation.

☑ *The code used for Balluff testing is a internal code of the software used to uniquely identify the toolholders and does not correspond to any user field.*

11.4 How to Search/Copy a Tool Set

As for the machine's origin, pressing the search button, will open the tool search window through which is possible search for a specific Tool Set by filling part of the Machine Name, Tool Set or Tool Code in this table.

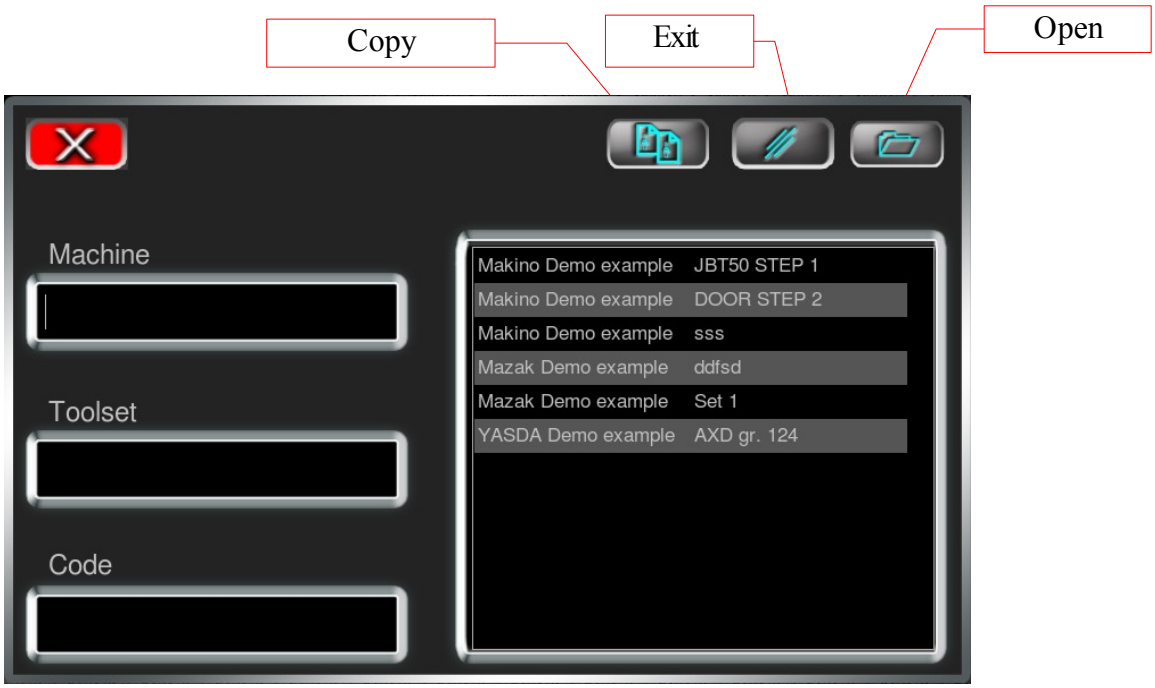


Figure 76: Search/copy of tool sets

It is also possible to copy a Tool Set from one tooling machine to another.
After selecting a set it is possible to access to the machine destination window clicking on the copy button :

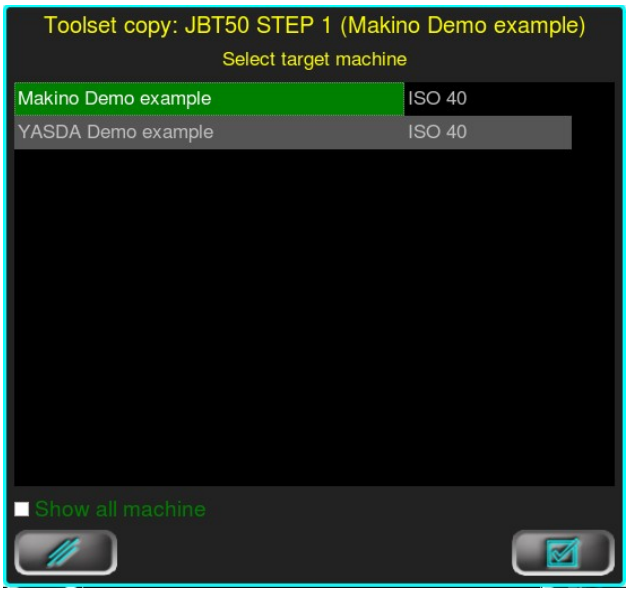


Figure 77: Copy of tool sets

The window shows the machines that have a spindle compatible with the machine associated with the set that you want to copy.
The process of copying compensate the origins if they are different between the source machine and the target machine.

☑ *It is possible to copy Tool Sets whitin machines that have different spindles, in this case the mesurement values won't be copied.*

11.5 Data Reading from Magnetic Chip

If a Balluff format is defined in the machine, you can access the tool and read the data directly from the magnetic chip.
You will be asked to approach the reading head to the magnetic chip; after that, data reading will begin, and then the table with the acquired data will be displayed.

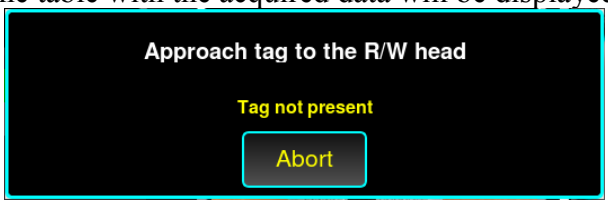
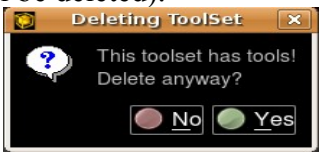


Figure 78: Magnetic chip reading

If there is the tool inside a Set, you can access it by pressing “Open”; vice versa, a tool not found message will be displayed. Press “OK”, so that the software will allow saving the data acquired by pressing the “Copy” key in order to copy the data when the tool will have been created.

11.6 Delete a Tool Set

You can delete a tool set that was previously entered, but you have to pay great attention because it will imply the deletion of all tools that are associated with that set.
The deletion operation must be carried out by pressing the relevant key in the Tool Set list page (the selected set will be deleted).



You will be asked to confirm the deletion of the set if it includes tools; if the answer is yes, the Tool Set and the relevant associated tools will be deleted.

12 HOW TO RECOVER AND BACKUP THE DATA

12.1 Foreword

A correct and periodical back-up operation allows, in case of accidental data loss or due to hardware failure, recovering all data that are stored in the presetter from the start-up.
The more frequently this operation is performed, the simpler and quicker the recovery of the complete operation of the Khyan preset, if it is necessary to install the system once again.

As for the backup, you can make use of an external storage support (ex. flash-drive) or, if the machine is connected to the corporate network, of a shared folder within the same network.

12.1.1 Back-Up Operations

The following files must be saved, they start from the most important and essential one.

- The "**204.sqb**" file to be found in the folder: /home/elbo/Presetter, indeed, includes the file of all machine origins, the tool sets and the relevant stored tools.
- The folder: /home/elbo/Presetter/snapshot, as you saw in paragraph 7.5, could include all photographs of the tools obtained by capturing the screens from time to time.
- The folder: /home/elbo/Presetter/pictures, instead, may include the personal photographs connected to the machine tools, the sets or the tools.
- The folder: /home/elbo/Presetter/Reports may include list prints or customised labels.

12.1.2 Recovery Operations

To recover the files in case of need, it is enough to copy them into the original folders.

> **N.B.** To recover the entire system, you need an external CD player to be connected to the USB port and the recovery CD supplied with the machine.

13 LABEL QUICK PRINT

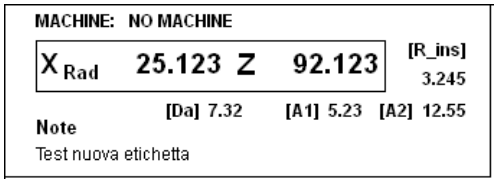
The label quick print command allows printing a label with the data of a tool even if it does not belong to a specific set; you have just to manually enter the data, if they are known, or measure the tool by using the 106V vision system

Indeed, if you press this key, the following screen will be displayed

Figure 79: Label printing

As already said, the fields (the ones that are considered to be necessary) can be manually entered or, if you switch to the camera mode, they can be calculated by using the functions that were previously described in paragraph 9.
If you press the print button, the usual dialog box will be displayed and it will allow specifying the printing type you want to obtain

The following example shows a label in which all current fields have been entered



14 GUPP – POST PROCESSOR UNIVERSAL GENERATOR

14.1 Foreword

GUPP (Post-processor Universal Generator) is a language that allows creating the post-processors for sending the correction data to the CNCs.
Its programming is extremely simple and intuitive.
The Khyan presetter is supplied with most of the known post-processors, but sometimes you need to adapt the standard format to the specific numeric control, due to particular settings of machine parameters of the CNC.
In addition, you can use the GUPP to create post-processor formats for new numeric controls.


To access the GUPP configuration, press the key to access the GUPP in the machine configuration screen

Figure 80: GUPP – Post-processor universal generator


It saves the file by overwriting the existing file.


It updates the preview if you modified the structure of the file.


It saves the file and allows assigning a different name (to be used to create a copy of the original file).


It exits the post-processor screen.

In the post-processor format modification area, you can edit a post-processor format or create a new one; the name that is displayed in the "selected post-processor" box is used for saving operations.
☑ Post-processor format files are recorded in the home/elbo/Presetter/Postpro directory.

14.2 How to Create or Modify the Post-Processor Format

The post processor format defines the structure of the file that was created by using the post-processor option. Possible modifications or creations of new formats can be carried out within the GUPP by referring to the documents by the CNC manufacturer that deal with the tool table format or the instructions to load the ISO program for the tools.
If you press the key, you can see the file preview (NULL characters are not displayed).

14.3 Specifications for Universal Post-Processor

The post-processor format has the following structure:

- *post-pro parameter definition* *Definitions*
- *tool table heading* *Head*
- *tool table line format* *Body*
- *tool table tail* *Tail*

14.3.1 Definitions

In the definitions section, you can modify the pre-arranged parameters (default) that are used in the format, for example you can set a value other than 10 (default value) as clamp numbering step.
The definitions section must be at the beginning of the template file and has the following structure:

<SD> this line cannot be modified
….definitions
<ED> this line cannot be modified

The specified definitions modify the default value that would be otherwise considered as valid, the value must be specified after the character = (ex. EB=10:13:13, SN=5).
☑ *The definitions section is optional, that is, if it is not necessary to modify the default values, the section can be completely omitted.*

Cod.	Description	Type	Default	Example
EB	Clamp end code, specified as a list of ASCII codes. The clamp end signal is introduced at the end of each tool line. The ASCII codes must be separated with the symbol:.	ASCII list	13,10 (CR+LF)	EB=10:13:13
SN	Clamp numbering start number (@N)	Integer >0	1	SN=5
PN	Clamp numbering step (@N)	Integer >0	1	PN=1
DE	Decimal separator N.B. «:» cannot be defined as a decimal separator	Character	. (dot)	DE=,
AL	If it is true, a file will be created with all possible calibrators (defined in machine configuration) rather than only the ones that are defined in the table. If AL is true, the value of the ZE flag will be ignored.	0 (false) 1 (true)	0 (false)	AL=1
SE	Flag for specifying + in positive numbers	0 (false) 1 (true)	0 (false)	SE=1
ZE	Flag for generating the tool table line also for tools with L=0 and R=0; if it is false, no line will be generated	0 (false) 1 (true)	0 (false)	ZE=1
IM	Flag for generating the calibrator file by using all measurements in the table and not only the ones that have been recently measured. By default, Toolingup generates the calibrator file by using only the measurements that are highlighted in blue; if this flag is true, all measurements in the table will be used.	0 (false) 1 (true)	0 (false)	IM=1
FN	X and Z default numeric format, that is, the format that is used to express radius, length and insert radius when there is no format specification.	Format (see number formatting)	###0.000	FN=000.000
NA	File name. This parameter is used as file name for tool correction (registration name on HD). The name specified by the user during post-processing will be ignored.	File name		NA=pippo.txt

☑ *The clamp end code will be automatically introduced after every line, except for the last head line and tail lines.*

14.3.2 Head, Tail

The heading and the tail of the tool table are set by defining the characters that form the heading and the tail of the table. In the post-processor format, you can write a text, which will be copied as it is into the post-processed file, or you can use special characters that represent functions or variables.
After the <ED> clamp (if present), there may be an arbitrary quantity of the following codes and in any order:

Code	Description	Type
@$(n)	ASCII code for the character that you want to enter; it is used to specify the ASCII characters under 32 and above 127	integer
@&(m:n)	Equivalent to the STRING basic instruction, that is, the n ASCII code character will be repeated m times	
@E(nome)	It enters the name file (the file must be present in the directory: c:\Toolingup\postpro)	string
//	Remarks, any item that is on the right of these characters will be ignored	

If you enter @&(10:65) in the post-processor format, the following result will be obtained: AAAAAAAAAA.

☑ *The NULL characters (0 ASCII code) are not displayed in the preview*.

14.3.3 Number Formatting

Strings and numbers are formatted by using the "^" command; the formatting instruction has the following syntax:

^(variable or constant to be justified, justification format)

The following characters can be set for justification format numbers:

digit placeholder; if the digit does not exist, nothing will be entered
* digit placeholder; if the digit does not exist, a space will be fixed
0 digit placeholder; if the digit does not exist, a zero will be fixed
. placeholder of the decimal separator (bound to the DE parameter)
+ placeholder for the algebraic sign. This setting must be used together with the * placeholder, so the sign will always be in the specified position and the numeric value will take up a constant number of characters. The + sign must be the first sign of the format.
/ inhibitor of the plus sign. If the SE parameter is true, sometimes (ex. the tool correction number) it will be incorrect to specify the number with the plus sign; to inhibit the addition of the plus sign, you must specify / in the format, so the sign will be omitted. The / sign must be the first sign of the format.

Formatting examples

@L	Instruction	Result
123.45	^(@L:0000.000)	0123.450
23.789	^(@L:+****.000)	+ 23.789
-23.789	^(@L:####.000)	-23.789
-123.45	^(@L:0000.###)	-0123.45
123.45	^(@L:+0000.###)	+0123.45
123.458	^(@L:###0.00)	123.46

☑ *If the value to be formatted has a number of decimal digits that is higher than the number that is set in the format, the value will be rounded off to the fixed number of decimals. .*

14.3.4 Dependence on the 'SE' Parameters

The SE parameter establishes that it is necessary to specify the + sign for positive numbers; if the SE parameter equals 1 (true), the sign must be considered in the same way as a digit, that is, it takes up a position in the format as a digit does. If the format is formed by 0s only and the SE parameter equals 1 (true), the sign will be positioned on the left of the first zero in the format.

Examples

@R= 10.12 Format ***0.000	
	R@R
SE=0	R 10.120
SE=1	R +10.120
Format +***0.000	
SE=0	R 10.120
SE=1	R+ 10.120

@R= -10.12 Format ***0.000	
	R@R
SE=0	R -10.120
SE=1	R -10.120
Format +***0.000	
SE=0	R- 10.120
SE=1	R- 10.120

14.3.5 Body

The line that repeats in the tool table must be included between <SOR> and <EOR>; in it, you can use the same instructions of the heading and the tail, as well as add some variables. By using the variables, you can enter the value of radius, length, etc.

List of available variables

Code	Description
@T	Tool correction number
@R	Tool radius
@X	Theoretical tool radius
@L	Tool length
@Z	Theoretical tool length
@I	Insert radius
@O	Insert orientation
@N	Clamp number
@C(n)	Tool code (n is the maximum number of characters)
@B(n)	Tabulation to the n column
@D(n)	Tool description (n is the maximum number of characters)
@U(n)	Notes (n is the maximum number of characters)

☑ *If you need to enter the @ character in the post-processed file, it will have to be specified by using the relevant ASCII correspondent @$(64).*

14.3.6 Rational Operators (+ - * /)

The rational operators can be used together with all numeric variables (T, R, L, I, O, N) in the following way:

<var>(<op><nn>)

<var>= T,R,L,I,O,N
<op>=+-*/
<nn>=nsingle accuracy number or other variable
If @T equals 10, the programming of @T(+5) will obtain the 15 value, while the programming of @T(*2) will obtain 20.
The programming of @L(+@I) will obtain the value of the length added to the one of the insert radius.

☑ *If you use decimal values as nn, the dot (.) will have to be compulsorily used as separator.*

14.3.7 Example

Suppose you have a tool table including the following values:

Tool calibration no.	Type	Radius	Lenght
1	center drill	0	87.325
2	Cutter D. 20	19.987	102.655

You want to create the post-processor format to send the data to an Okuma CNC. After having read the manufacturer's manual, you identify the instructions to load the tool table (VTOFH and VTOFD) and know that the file to be sent to the CNC must be called TOOLS.MIN. Now, you know everything you need in order to create the desired post-processor format, that is, you know that the heading will have to include the name of the file (the manufacturer's specifications mention $TOOLS.MIN%) and the tool calibrators must be loaded by means of VTOFH and VTOFD with the correct syntax. The file must end with M2 and the transmission is closed with %.
The post-processor format will be the following type:

Post-processor format	Result
$TOOLS.MIN% <S> N@N (@D(20)) N@N VTOFH[@T]=@L N@N VTOFD[@T]=@R N@N () <E> N@N M2 %	$TOOLS.MIN% N10 (PUNTA DA CENTRO) N20 VTOFH[1]=0 N30 VTOFD[1]=87.325 N40 () N50 (FRESA A INSERTI D. 20) N60 VTOFH[2]=-19.987 N70 VTOFD[2]=102.655 N80 () N90 M2 %

15 MAINTENANCE

15.1 Routine Maintenance

The presetter does not need any specific maintenance, however we suggest the following maintenance.

15.1.1 Spindles, Adapters, Resetting Gauges Lubrification

To maintain perfect efficiency and to grant long term precision it is wise to clean and lubricate these basic presetter parts at every substitution and before replacing them in a proper place.
Concerning the spindle, which is often alone and is always positioned on the presetter, it is necessary to clean only the rectified visible parts; at least at the end of the working shift, in order to preserve them from oxidation.

For every lubricating operation we suggest you use special antioxidization product, such as the Chesterton 775 or something similar.

15.1.2 How to Clean the 106V Vision System

Similarly to the panel, also clean the 106V camera with a clean cloth, soaked in suitable degreasing products (do not use solvents and abrasive products). As for the optical systems, the lens and the illuminator, use an antistatic cloth; in case, moisten the surface with a spray or detergent liquids specific for optical lenses.

15.1.3 Compressed Air Filter Cleaning

Check periodically the pneumatic system filter placed on the back of the presetter and corresponding to the compressed air connection tube (see Par. 6.5.2) and, when required, operate the valve in order to blow off any condensation, which could be formed in the transparent cap. When it is necessary to clean the filter, disconnect the pneumatic feed and unscrew the transparent cap; then, by using gasoline or another kind of solvent, disassemble and clean the filtering piece. Dry it by compressed air blowing, before reallocating it in its seat.

16 TROUBLE SHOOTING

16.1 Foreword

This chapter is dedicated to solving the most common problems that arise during the use of the tool presetter. Each problem is associated with a series of checks to be carried out and corrective actions. The list obviously cannot contain all possible problems and their solutions; if necessary, consult your local distributor.

16.2 Problems, Causes and Solutions

16.2.1 Problem: presetter does not switch on.

CAUSE: general power supply failure.
SOLUTION: check the connection with the external power supply circuit;
check any external switches and/or fuses and, if damaged, replace them
CAUSE: Tool presetter power supply failure.
SOLUTION: Check that the ON/OFF switch to be found on the rear of the machine is in the ON position;
Check that the PC start button has been pressed, and thus lighted (blue color).

16.2.2 Problem: the axis do not release.

CAUSE: Axis clamp buttons via software entered.
SOLUTION: release key of the relevant axis
CAUSE: Lack of pneumatic feeding or too low air pressure.
SOLUTION: Supply the presetter with compressed air 5−6 BAR.
CAUSE: Solenoid or electronic valve damaged.
SOLUTION: Contact technical service assistance for the component replacement.

16.2.3 Problem: upwards traverse difficulties of Z axis.

CAUSE: Route balance weight spring.
SOLUTION: Remove the rear protection case of the column, verify the balance weight spiral spring is broken and contact technical assistance service for the component replacement.

16.2.4 Problem: the index does not work. (optional VDI toolholder only)

CAUSE: Lack of pneumatic feeding or too low a pressure.
SOLUTION: Supply the presetter with compressed air 5−6 BAR.
CAUSE: Solenoid or electronic valve damaged.
SOLUTION: Verify the functioning of the pilot lamp of the tool lock/unlock button, and contact technical service assistance for the component replacement.

16.2.5 Problem: axes calculation is incorrect but produces repeated measurement .

CAUSE: The linear compensation machine parameter is wrong
SOLUTION: Contact technical service assistance

16.2.6 Problem: calculation is incorrect and the measurement are not repetitive.

CAUSE: Due to an impact, the 106V fixed reticle is no more parallel to the axis of the machine.
SOLUTION: see next problem
CAUSE: Detection system or electronic equipment 706 damaged
SOLUTION: see next problem

16.2.7 Problem: axes counting does not take place.

CAUSE: Damaged axes management board or detection system.
SOLUTION: If the defect affects both the axis, the trouble is likely to concern the electronic equipment ; otherwise, the failure is due to the measurement system or to the cables. Contact technical service assistance for the component replacement.

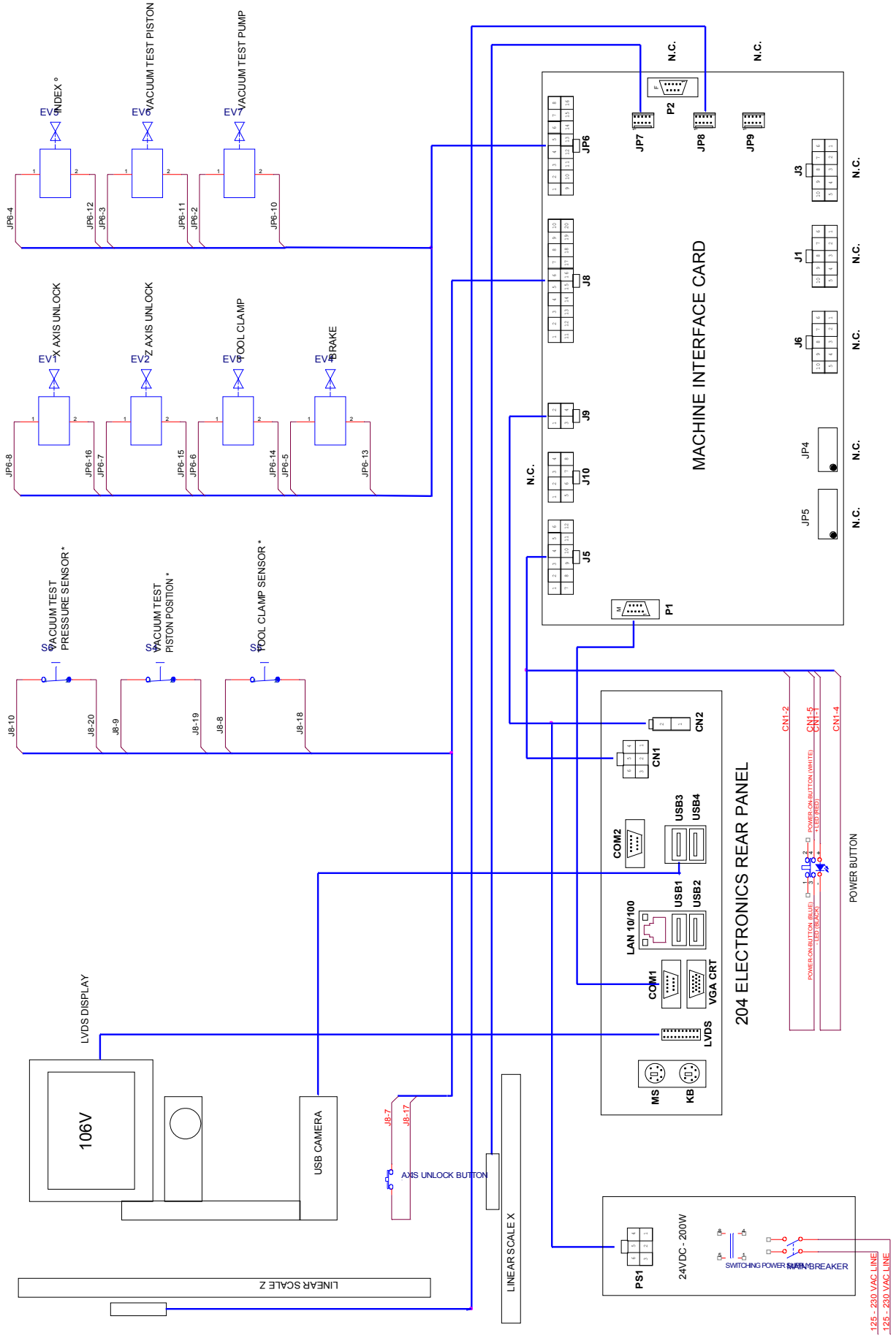
16.2.8 Problem: the auto-targeting gives different measurement on different points of the screen.

CAUSE: Uncorrect calibration.
SOLUTION: check the calibration parameter and contact technical service assistance.
CAUSE: 106V fixed reticle is not parallel to the axis of the preset.
SOLUTION: see the following point.

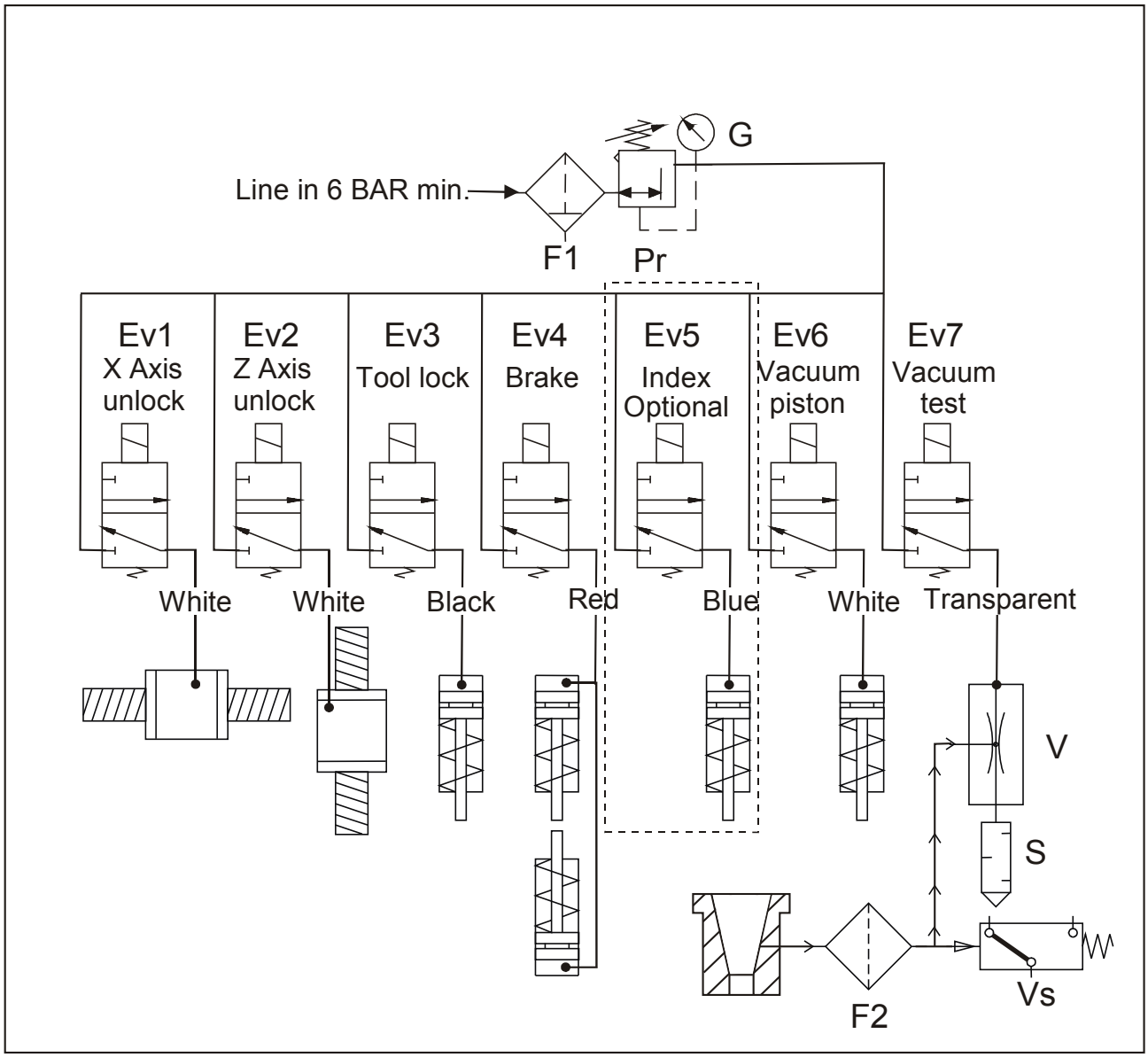
16.2.9 Problem: 106V fixed grid is not parallelto presetter axes and/or the image's focus is not at the point of maximum tangency of tool.

CAUSE: Possibly the 106V was jarred, thus moving the 106V out of position.
SOLUTION: Verify the mechanical integrity of the support and the fixing of all the optical components, then contact technical service assistance.

17 ELECTRIC DIAGRAM



18 PNEUMATIC DIAGRAM



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