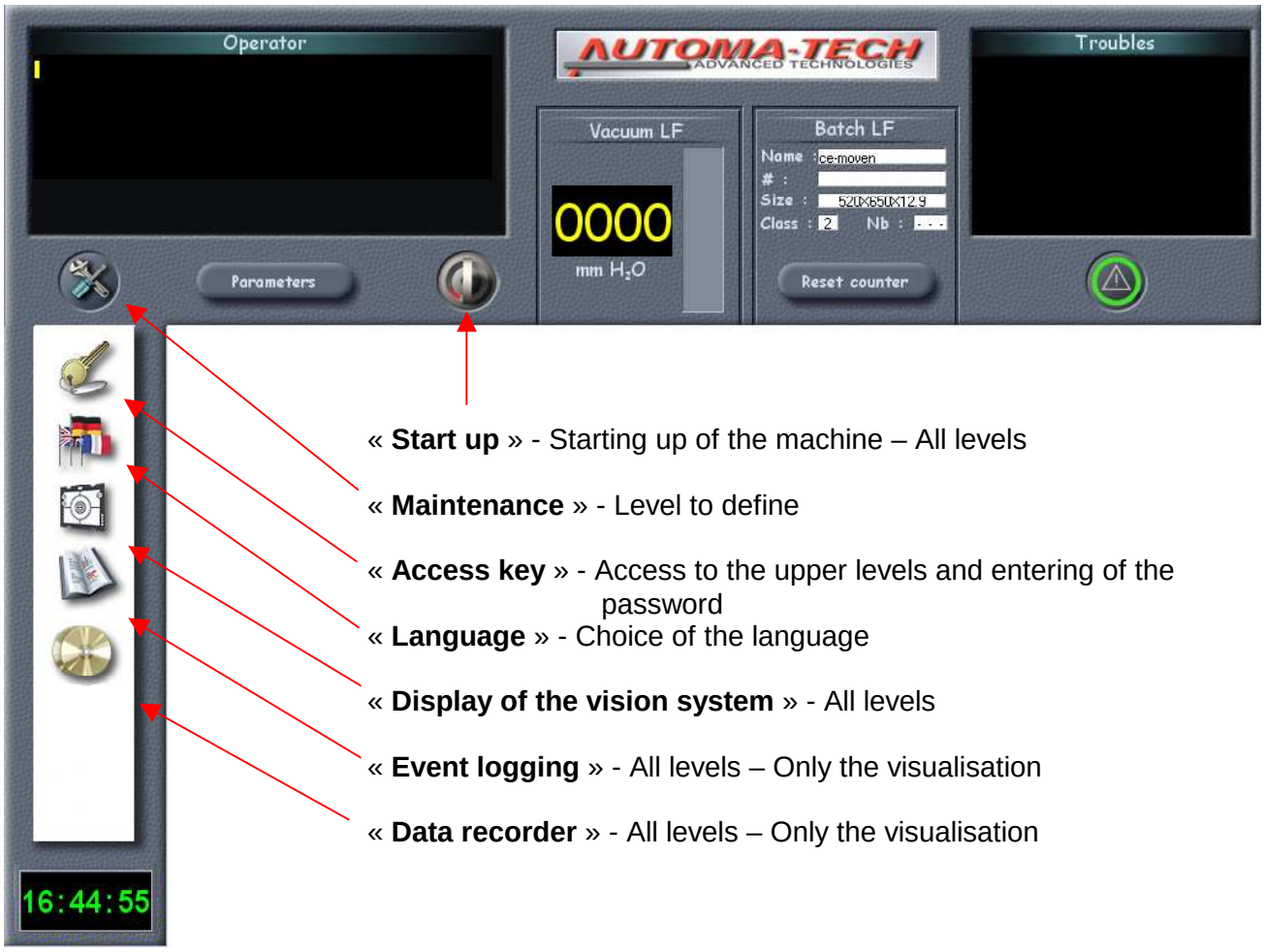
CONTENTS

1 – 1 HMI screen - Direct access

Click on one of these icons give a direct access to the corresponding screen.
According to the level, a password will be asked (see following pages.)



« **Start up** » - Starting up of the machine – All levels

« **Maintenance** » - Level to define

« **Access key** » - Access to the upper levels and entering of the password

« **Language** » - Choice of the language

« **Display of the vision system** » - All levels

« **Event logging** » - All levels – Only the visualisation

« **Data recorder** » - All levels – Only the visualisation

1 – 2 Levels of access

There are five levels of access to the differents menus (screens) defined by AUTOMA-TECH in the machine :

Level 0 : Operator
Level 1 : Team manager
Level 2 : Supervisor
Level 3 : Maintenance by the customer
Level 4 : Maintenance by Automa-tech.

Each of them is protected by a password (except the level 0)

Changing of levels

It is possible to not use all the levels defined above . For instance :
Level 0 : Operator
Level 1 : Supervisor
Level 2 : Maintenance for customer
Level 3 : Nothing
Level 4 : Maintenance for Automa-tech
These configurations must be made by the Maintenance people of Automa-tech, during the setting up in accordance with the needs of the customer.

Afterwards, the customer can modify the access to the differents menus (screen) inside a level defined above, but not modify the number of level.

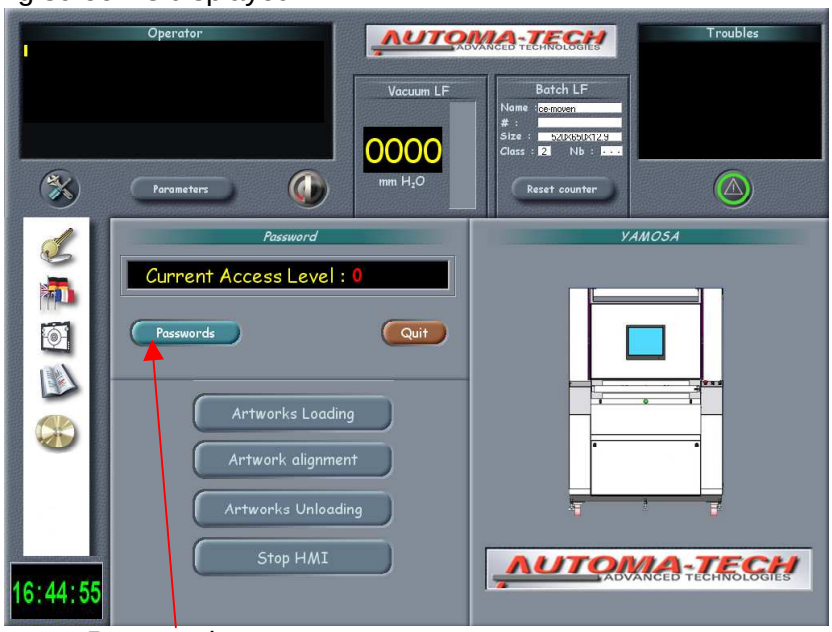
To modify the access inside a level :
- From anyone screen, Click on the icon 
- Your password is asked and an alphanumeric keyboard is displayed on the screen.
- Type your password and Enter.
- Then, it is posible to modify the access to your level and the lower levels but not the upper levels.

1 – 3 Passwords

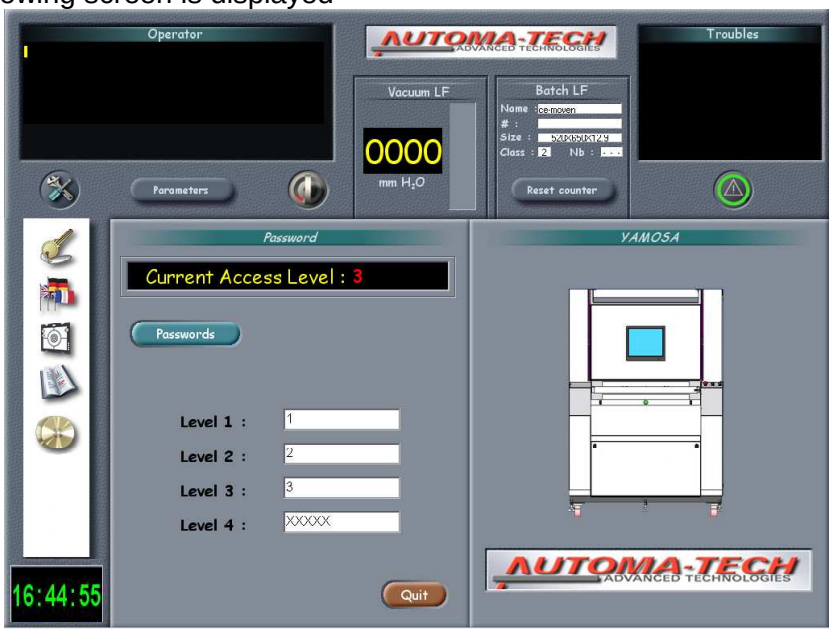
Each level is protected by a password, except the level 0.

Change of password

- From any screen, Click on the icon  (see paragraph 1 – 1).
The following screen is displayed :



- Click on the button « Passwords »
The following screen is displayed



Note : Only your password and the password for the lower levels are displayed in the Edit boxes of this screen. It is possible to change these passwords but not the passwords of the upper levels.

Procedure to change a password :

- Choice the Current Access Level.
- Type on the Edit boxes you want to change (an alphanumeric keyboard is displayed on the screen.

- Type the new password for the corresponding level and Enter.
- Click on « **Quit** » to come back to the precedent screen.

1 - 4 Language

Change of language

From any screen, Click on the icon  (see paragraph 1 – 1).
The following screen is displayed :

- Select the check box of the wanted language.
- Select the corresponding units.
- Click on **« Quit »** to come back to the precedent screen.

Note : The change of language asks amount of time.
"Press **« Quit »** until the language change"

1 – 5 Display of the vision system

Click on the icon  display on the right part of the screen, all the targets of the panel and the artworks seen by the cameras.

1 – 6 Data recorder

Click on the icon 
Recording of all the events occured during all the functionning time of the machine, in specific data bases.

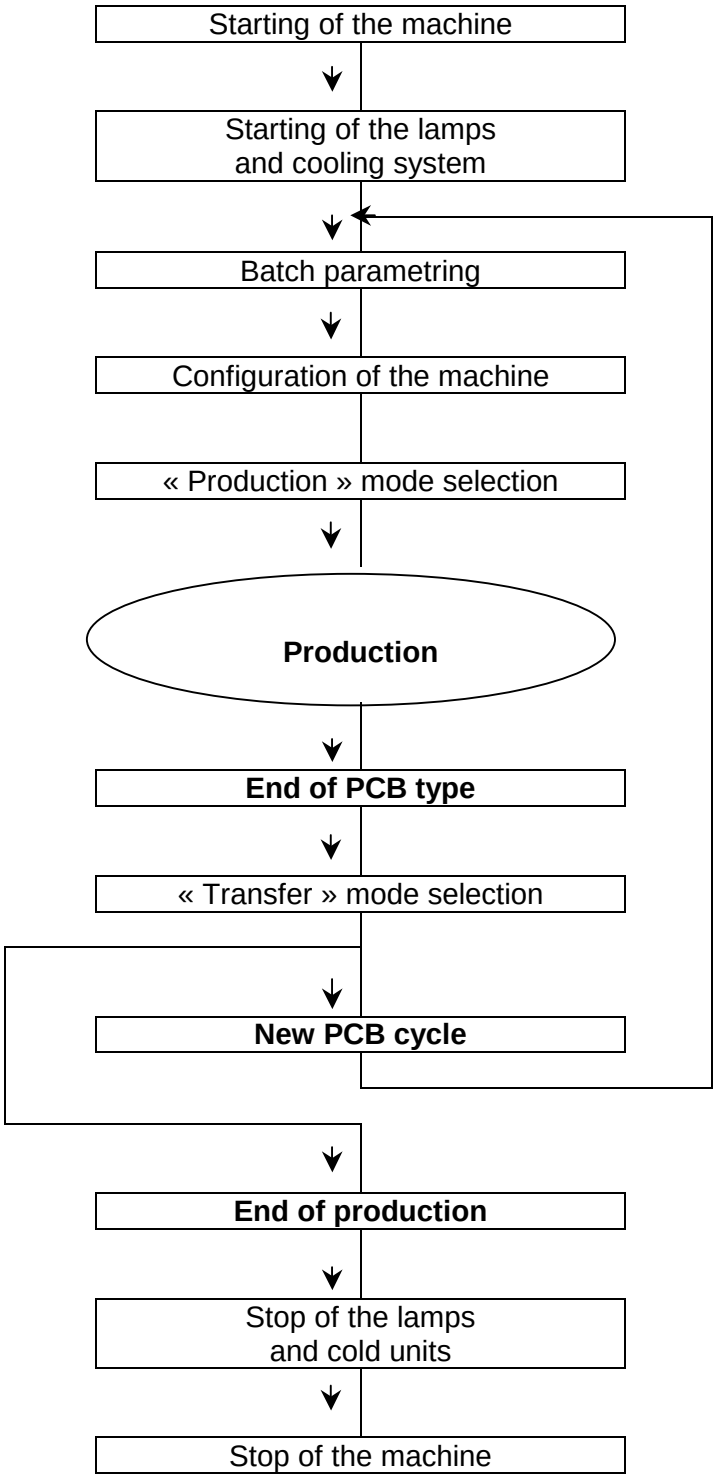
such as : Opening time of the machine
Yield of the machine
Maintenance analysis
Top ten of troubles
and so one…

1 – 7 Event logging

Click on the icon 
Statistical analysis of the results on one or several batches from the files recorded above :

such as : State of the machine
Modes of functionning
All troubles per group
All datas of production : batches and panels parameters
All actions of the operators

1.8 – Functionning diagram



2 - DRIVE OF THE MACHINE

Operating mode for the operator – Level 0

2 – 1 Starting up of the machine

Starting

The PC automatically starts. On the screen appears the acounting of the time.
The following screen of the IHM is displayed :

-Click on the icon  to display the starting up menu.

The following screen is display :

1. Push on the button "**MASTER START**".
2. Follow the indications of the screen to initialise the machine.
   - Activate the bi-manual command. The green light located on the right control board command lights on.
   - If the light is ON, the operator must activate the bi-manual command until the light off. (if the operator stops the bi-manual command activation, the machine stops and the light is staying ON. The operator must activate the bi-manual command again to continue the operations).
   -

During this phase of initialisation, the lower frame comes to the loading area. Then, it opens. After that, the operator can go on operating the machine.

2 – 2 Starting up of the lamps and cooling unit

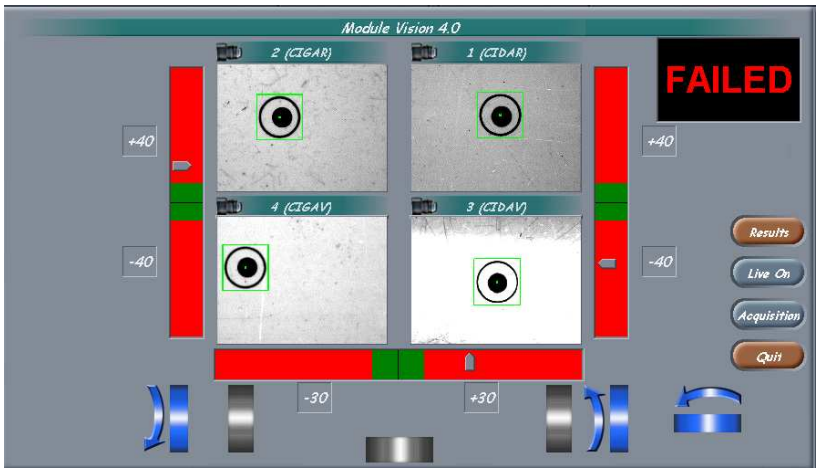
-First, you must be sure that the circulation of the air of the factory is Ok on the top of the light box or check the water supply in case of AF1400 on the machine.
-Click on the button « **Start lamps / cooling** ».
-Then « OK ». A lamp heating time of 10 minutes is necessary before the starting.
A message is displayed on the screen during the warming of the lamp.
While the heating of the lamp, it is possible to load and align the artworks on the 2 registration frames.

2-3 Artworks loading and alignment

1 – Push on « **Artworks loading** ».
2 - The frame which is in the loading area opens. Then, follow the indications on the screen.
3 – Place the arworks with the parts on the PCB pin system or on the artworks pins.
4 – Activate the bimanual command (the frame closes). The upper glass goes down and the artwork vacuum is activated. Then, the frame opens.
5 – Remove the two parts or move down the artworks pins.
6 – Position manually the cameras in order to see the targets on the screen. Click "**OK**" when this adjustment is done.
7 – Click "**Quit**" to come back to the "**Start up**" display.

After that, it's necessary to align the artworks.

1 – Click « **Artwork alignment** » to do an aligment of the two artworks of this registration frame. Follow the screen indications. Activate the bimanual command to close the frame.
2 – The upper glass goes down to detect the location of the targets on upper artwork.
3 – Then, the upper glass goes up and a vision screen is displayed.



4 – Align manually the artworks. See the document "Vision – Users' manual". Push on the button "OK" when the cursor are in the green area.
5 – Then, the upper glass goes down again in order to check the accuray of the alignment.
6 – If it's OK, the message "GOOD" appears on the screen. Then, click "OK" to finish this sequence.
7 – If it's not OK, the message "BAD" appears on the screen. Then, choice to do again the alignment. Click on the "retry" icon, if you want to do the alignment again or quit the sequence, by clicking on "exit" icon.

When the artworks are loaded and aligned on one frame, repeat the same sequence on the other exposure frame.

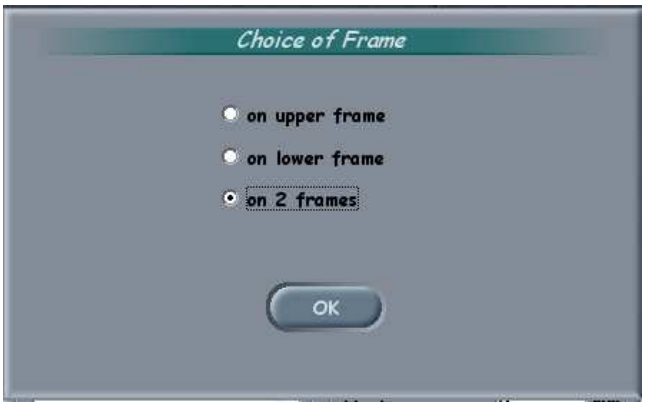
2 – 3 Batch preparation

On the same screen, Click on the button « **Parameters** ».
The following screen is displayed :

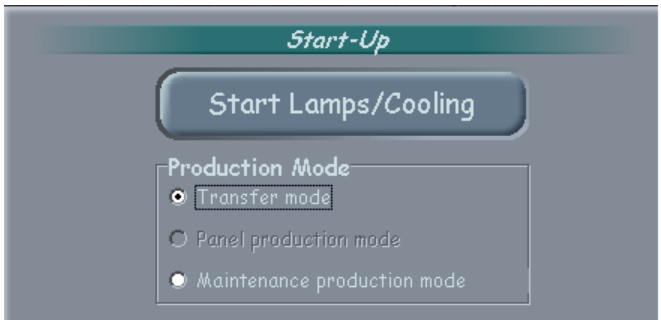
This screen contains :

1 – The name of the batch
2 – Enter the number of the batch
Click on the edit box « Batch # ». A numeric keyboard is displayed on the right of the screen
– Type the number of the batch, then Enter
3 – The Length, width and thickness of the panel
4 – The class of the batch

You can choose the type of PC boards to produce in the list « Available types »
You can choose on each frame validate the batch when you press “Enter”.



2 – 4 Choice of mode



In the main page , you can :

a – Click on the « Transfer mode ».
b – Click on the « Panel production mode ».
c – Click on the « Maintenance production mode ».

2 – 5 Transfer mode

1 – In the main page, it is possible to click on « **Transfer mode** ». So the activation of the bimanual command allows to close the frames, to transfer the two frames.

2 – It is possible to do « Artworks loading » and « Artworks aligment » on the first registration frame.

3 – It is possible to do « Artworks loading » and « Artworks aligment » on the second registration frame.

2 – 6 Panel production mode

1 – In the main page, it is possible to click on « **Panel production mode** » when the lamp is switched on.

2 – The registration frame is waiting a panel of the batch you select. Place a panel and follow the screen's indications to produce panel.

2 – 7 Maintenance production mode

1 – In the main page, it is possible to click on « **Maintenance production mode** » when the lamp is switched off and the access level is bigger than 0.

2 – The registration frame is waiting a panel of the batch you select. Place a panel and follow the screen's indications to produce panel.

2 – 8 Stop of the lamps and cooling unit

1 – Click on the button « **Quit** » to access to the « **Start up** » screen.
2 – In the Start up screen, Click on the button « **Stop lamp / group** ».
3 – Wait until the groups stop automatically (about 10 minutes).

2 – 9 Stop of the machine

1 – Push on the « **Emergency stop** ».
2 – Turn OFF the main switch.

3. - CONFIGURATION OF THE MACHINE

Operating modes for the team manager and/or supervisor – level 1 or 2

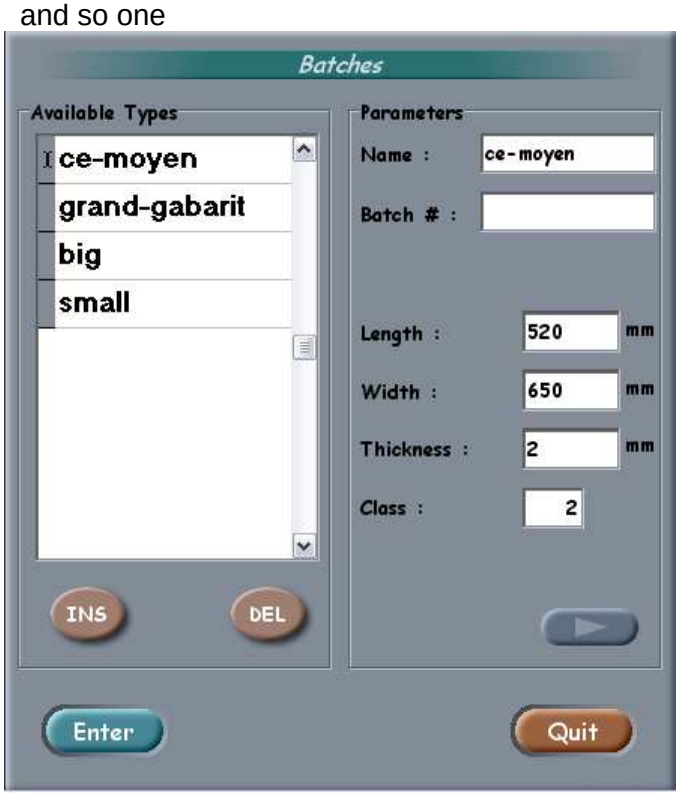
See paragraph 1 – 1

3 – 1 Parameters entering for a new type

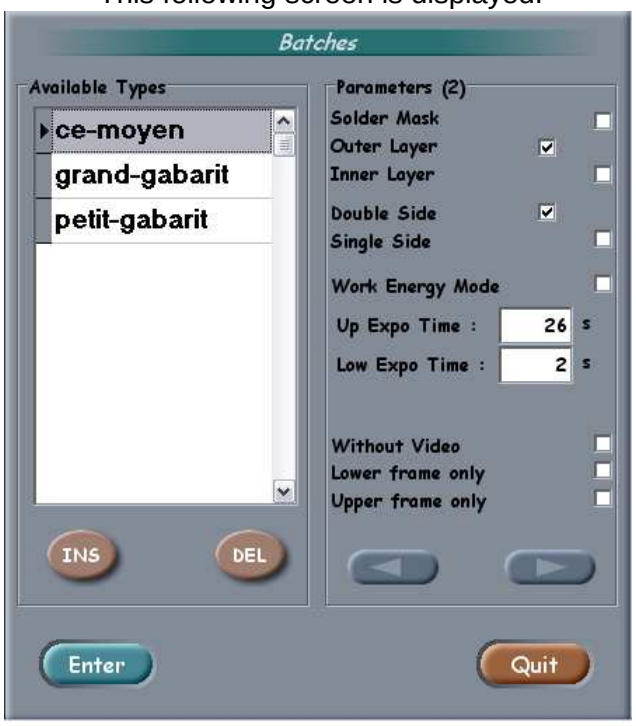
To produce a batch for a new type of PC boards, it is necessary to introduce and memorise all the characteristics of this new type in the computer of the machine.
For the following batches, the selection of this type in the list « **Available types** », allows the automatic configuration of the machine for this PC board.
There are four screen (or pages) to introduce these characteristics

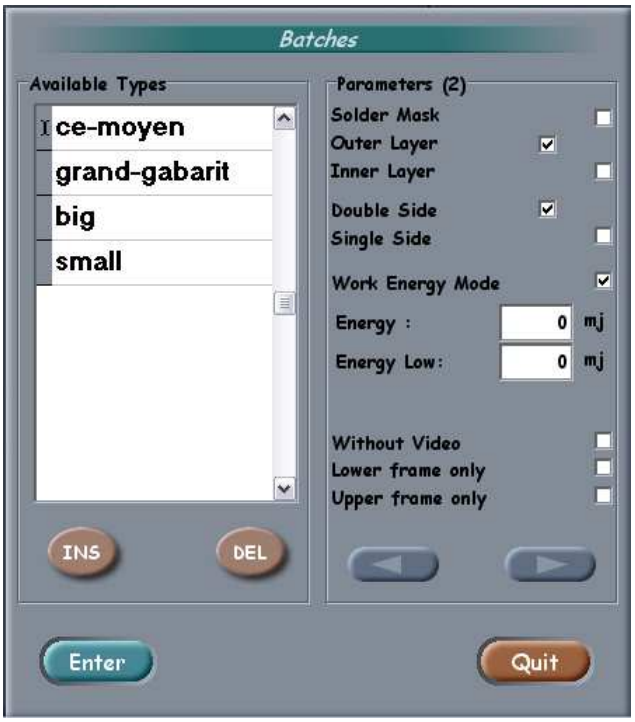
- Click on the button « **INS** » in the screen « **Batches** ».
- Click on the edit boxes corresponding to the characteristic to introduce. A numeric keyboard is displayed to the right of the screen.
- Type the corresponding characteristic.

for instance : Length
Width
and so one



This following screen is displayed.

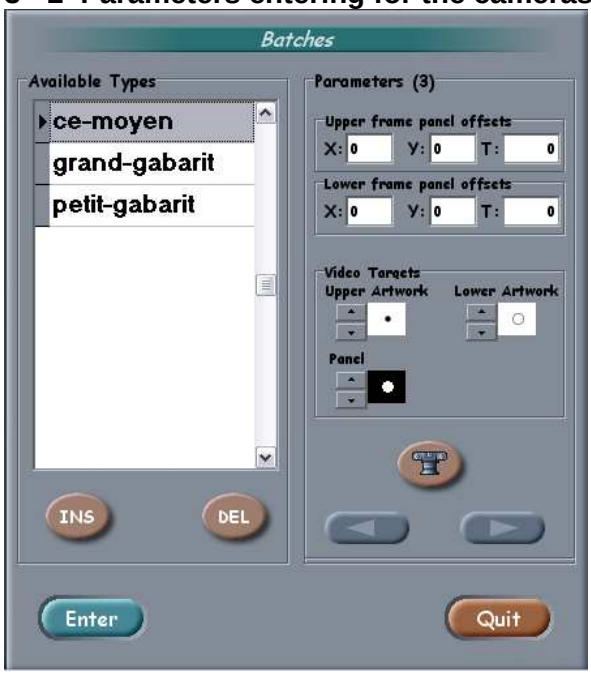


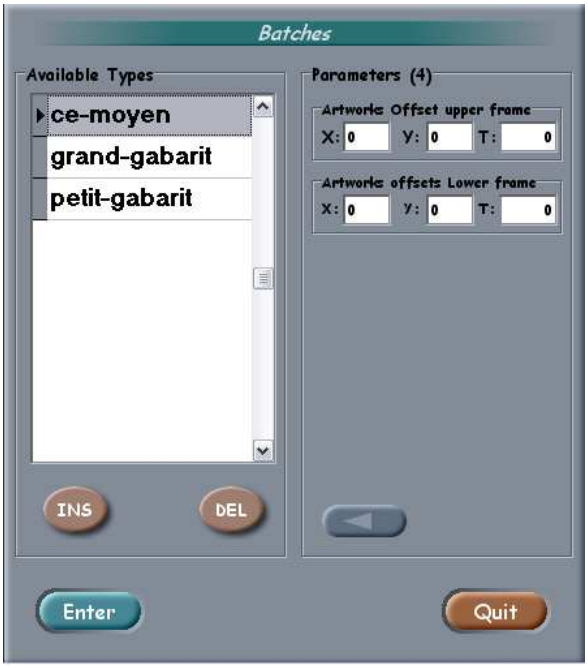


Type the corresponding characteristics :
- type of PCB (inner layer, outer layer, solder mask).
- exposition (single or double side).
- working in energy or time mode.
- Working with only one registration (and the two registrations).

- Select the characteristic by the check boxes and introduce it.
- Click on the right arrow to access to the following screen

3 - 2 Parameters entering for the cameras

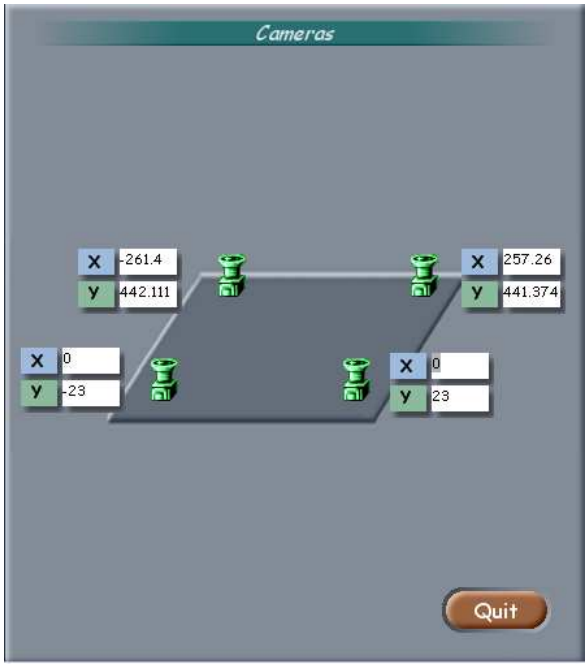




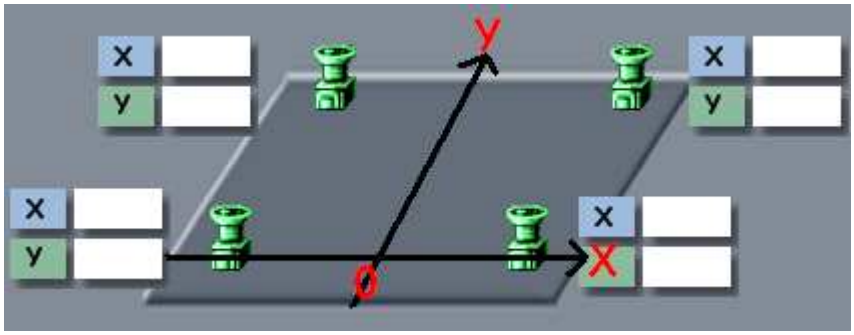
The access to the camera screen is made by the batches pages.

- In the screen displayed, Click on the icon 

The following screen is displayed :



Select the cameras which will be used for this PC board (the selected cameras appears in green).



Position of cameras : Introduce directly the theoritical position of the targets.

- Select the edit box for X and Y position of each camera.
- Type the position on the numeric keyboard displayed on the right of the screen.
- Click on « **Quit** » to access to the precedent screen.

3 - 3 Management of the batches

It is possible to :

- Remove a type of PC board in the list « Available list »
- Modify the parameters of a type of PC board.

To remove a type of PC board :

- In the first screen of batches, select the corresponding type and Click on the button « **DEL** ».

To modify the parameters of a type of PC board :

- Follow the procedure described to the paragraph 3 - 1

Note : These modifications can be made during the production of a batch of this type.

3 – 4 Offset

An offset allows to shift one of the two elements concerned with the alignement of a determined value in order that the alignment after vacuum was perfect. These two elements will then not be aligned from 0 but with a shift equal to the value of the offset.

3.4.1 Offset machine

These offsets are recorded as soon as they are writing in the HMI, and they are valids for all the batches.
They apply to the alignment artwork to artwork and artwork to panel. And they are taken into account when the alignment is done but they are not taken into account when the check after the vacuum is done.

3.4.2 Offset batches

These offsets are recorded as soon as they are writing at the batch validation.

They apply to the alignment artwork to artwork and artwork to panel. But they do not apply to the check after vacuum. And they are taken into account when the alignment is done but they are not taken into account when the check after the vacuum is done.

3 – 5 Type of production

When the machine is in Production mode (see paragraph 2 – 5) different kinds of printed circuit board can be insolated. The type of circuit board is chosen when the parameters of the batch are entered. (see paragraph 3 – 1)
Three kinds of production are allowed :

- Inner Layer
- Outer Layer
- Solder Mask

4 - MAINTENANCE OF THE MACHINE

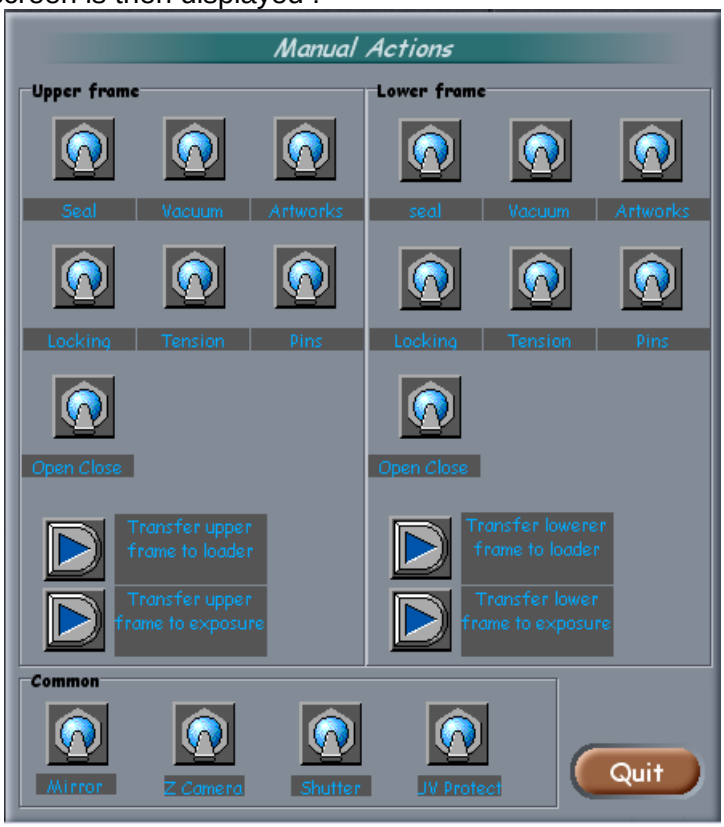
Operating modes for the technician of maintenance of the customer – level 3

From any screen, click on the icon  - See paragraph 1 – 3
The following screen is displayed :

From this screen, all actions of verification, adjustment, calibration and measures are possible, with the correct password.

4 – 1 Manual actions

-Click on the button « **Manual actions** ». A message on the screen asks to select the manual mode.
The following screen is then displayed :

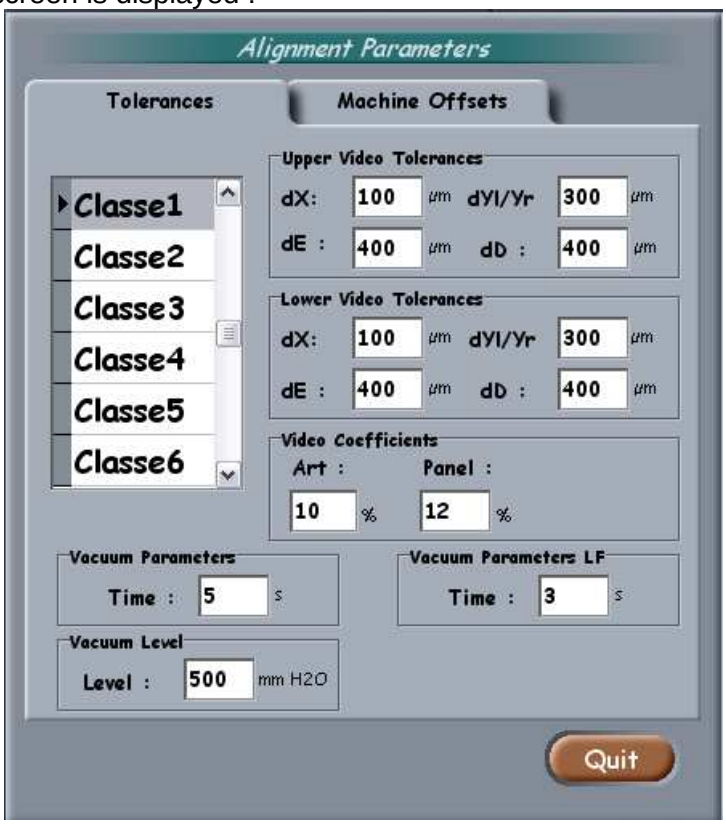


In this window, several buttons are displayed.
Each of them contain corresponding to different actions.
Choice a manual action, Click on the button.
A window is displayed on the screen to give all explanation.
On the control board, one or some buttons are blinking or fixed.
Follow the instructions on the screen to perform this action.
Click on « **Quit** » to access to the precedent screen.

CAUTION : DO NOT OPERATE AN INTERVENTION INSIDE THE MACHINE DURING THESE MANUAL ACTIONS.
IT CAN BE DANGEROUS FOR THE OPERATOR OR FOR THE MACHINE.

4 – 2 Parameters of aligment

In the screen Maintenance, Click on the button « **Adjustment parameters** »
The following screen is displayed :



In this window, 2 tabs are displayed.

In the « **Tolerances** » tab, introduce the tolerances of panel alignment, inside the exposure cabinet, according to the class of the PC board.
- Select the wanted class.
- Introduce or modify the tolerances for the accuracy for aligment, on the numeric keyboard, after selection of the corresponding edit box.
  - dX concerns the accuracy alignment for X directions.
  - dYl/Yr concerns the accuracy alignment for Y directions.
  - dE is the entraxe measurements between targets of one artwork. The value of dE captured is the maximum entraxe value received by the machine.
  - dD is a measure of the local distance between the two targets of upper and inner artworks. DD value is the maximum local distance received by the machine.
  - Video coefficient : it is a percentage value applied only to dX, dY, dθ tolerances. The registration algorithm takes into account this coefficient while artwork and panel alignment. It does not apply during the checking done after vacuum.

For example :

1. dX/Y = 25 µm, dT= 200µrad , coeff.= 100%
The machine is doing alignment and correction with (100%x25= 25 µm in X and Y direction, 100%x200= 200 µrad in angle).
After vacuum, the machine checks if the alignment is always OK with 25µm in X and Y and 200µrad in angle.

2. dX/Y=25 µm, dT= 200µrad, coeff.= 50%
The machine is doing alignment and correction with (50%x25= 12.5 µm in X and Y direction, 50%x200= 100 µrad in angle).
After vacuum, the machine checks if the alignment is always OK with 25µm in X and Y and 200µrad in angle.

The "**Up**" coefficient applies to panel/upper artwork alignment.

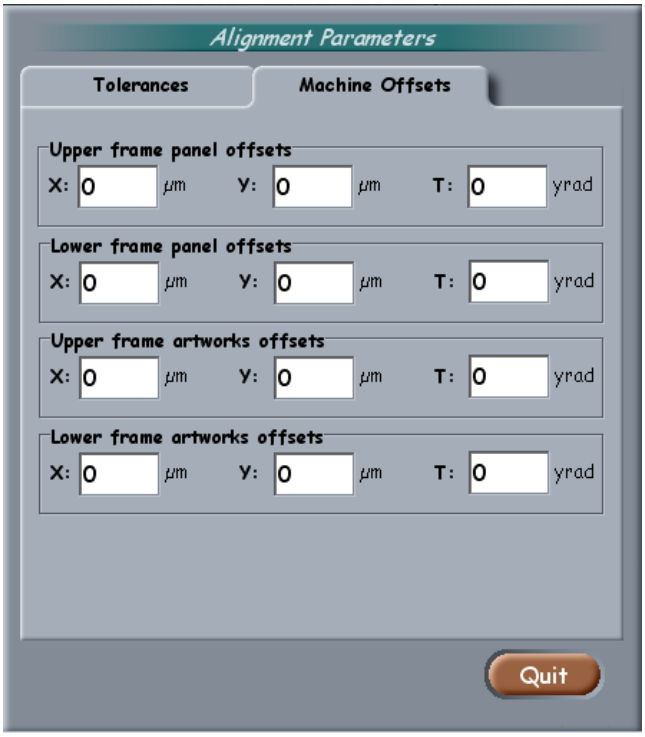
The "**Low**" coefficient applies to panel/lower artwork alignment.

The modification of one or several parameters will be recorded with the choose of a new batch.

- Introduce the vacuum parameters :
The modification of these paramaters will be immediatly effected.
  - Time : it is the time choosen to apply the vacuum level (batch type) before checking the alignment. This time corresponds to the necessary time to reach the right vacuum level on the panel).
  - Level : it is the level vacuum reference to apply in the machine. A difference between the vacuum level on the panel and the level of measured vacuum causes a vacuum level default.

- Select the second tab.

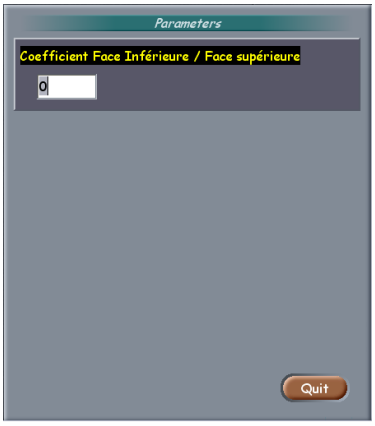
The following screen is displayed :



- Introduce the offsets in X, Y and T carrying out a shift during the alignment. This shift is equal to the value of the offset introduced.
- Select one of the edit boxes and type the value on the numeric keyboard.

The shift is only taken into account during the alignment operation and not when the check after vacuum is done.
Therefore the unit tries to align the elements with a shift. Then it checks, as soon as the vacuum of the panel is done, that all the elements are aligned and centred.

4 – 3 Adjustments



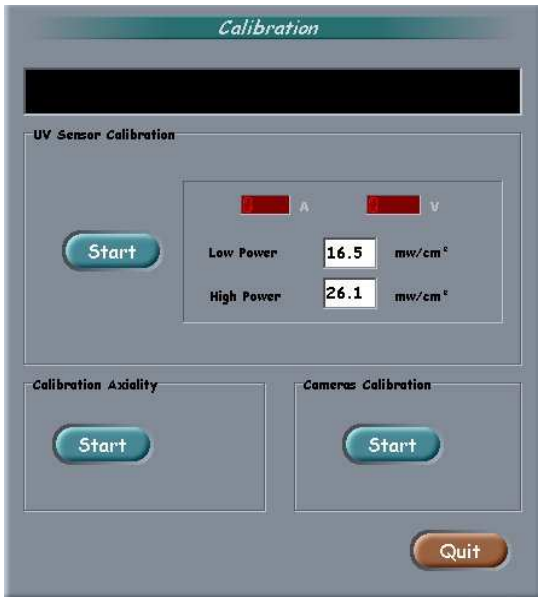
On this screen, it is possible to change the coefficient of the luminous power between the upper side and the lower side of the panel.

4 – 4 Video adjustments

In the screen Maintenance, Click on the button « **Video adjustment** ».

4 – 5 Calibration

In the screen maintenance, Click on the button « **Calibration** ».
The following screen is displayed



4.5.a Calibration of the lamps

- Click on « **Start** » and follow the instructions displayed on the screen.

The values of power to be indicated on the screen are those which are received by the panel.

4.5.b Calibration of the cameras

- Load the artworks corresponding to the calibration. Validate an existing batch. Do not align the artworks.
- Click on « **Start** ».
- Follow the instructions displayed on the screen.

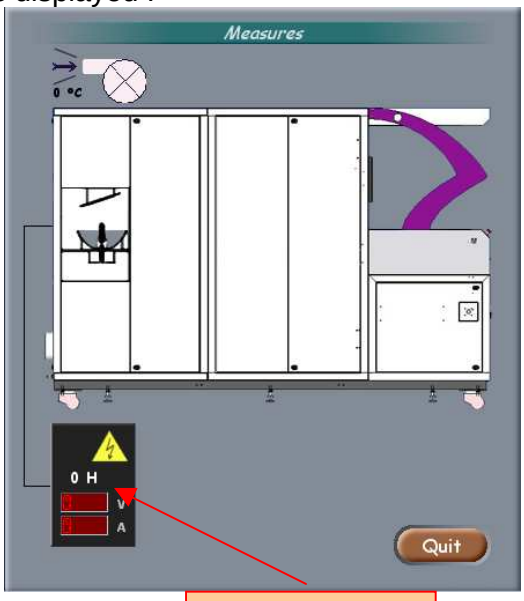
The calibration of the camera allows the unit to determine the pixel ratio of each camera. This is an important operation for the preciseness of the alignment.

4.5.c Axiality of the cameras

- Load the artworks , validate a batch and align the artworks
- Click on « **Start** » and follow the instructions on screen

4 – 6 Measures

In the screen Maintenance, Click on the button « **Measures** ».
The following screen is displayed :



This screen allows to visualise :

- The voltage and current of Power supply of the lamps.
- The working time of the lamp.
- Lamp switch on or switch off.