



USER GUIDE

VIRTUAL INDUS - Production Control



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1. Introduction

This document review in detail the different functionalities of the **VIRTUAL INDUS** simulator. This simulator works with the virtual-reality headset **HTC Vive**.

In the first part, we will review every functionality non-related to a sequence: headset adjustment, teleportation, controls etc.

The second part explains every instruction related to a sequence/exercise of the simulation.

1.1 Installation

For more information about the HTV VIVE system and the Virtual Indus software, please refer to "DTVI0600004__F-2.2_Installation.pdf" documentation.

2. General Operation

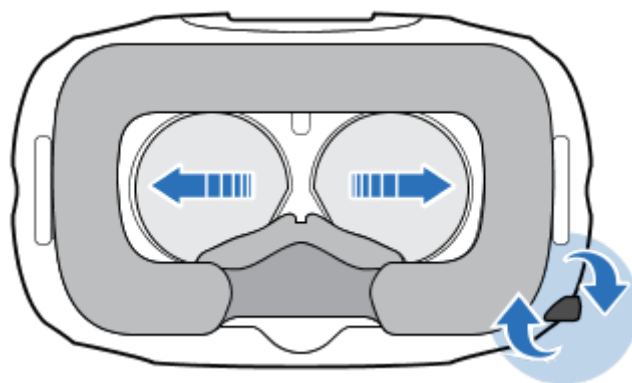
2.1 HTC Vive



The **HTC Vive** is a virtual-reality headset with a refresh rate of 90Hz. It allows a view angle of 110° and have a screen of 1200 x 1080 pixels for each eye, or 2160 x 1200 pixels. This headset also has sensors as gyroscope, accelerometer and laser position sensors.

2.1.1 Interpupillary Distance

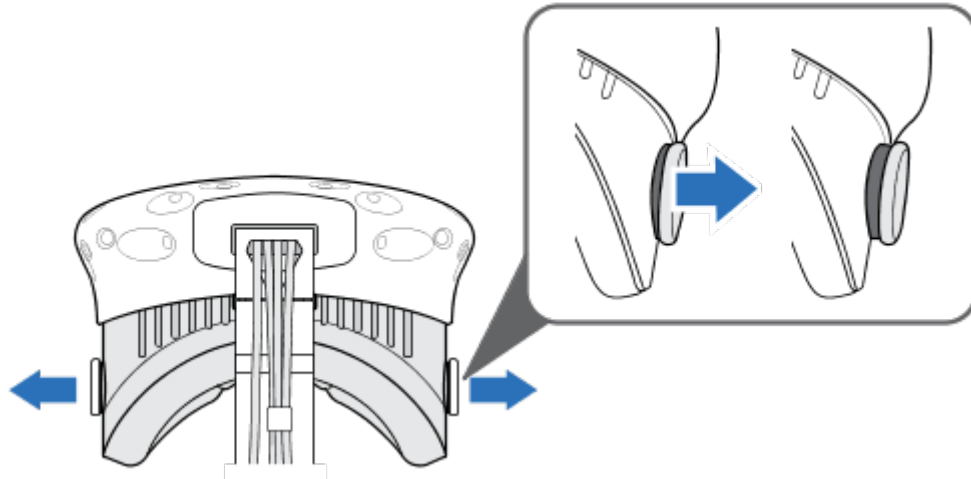
The **interpupillary distance** is the distance between the pupil center point of each eye. It can be adjusted manually with a wrench adjuster on the right side of the headset.



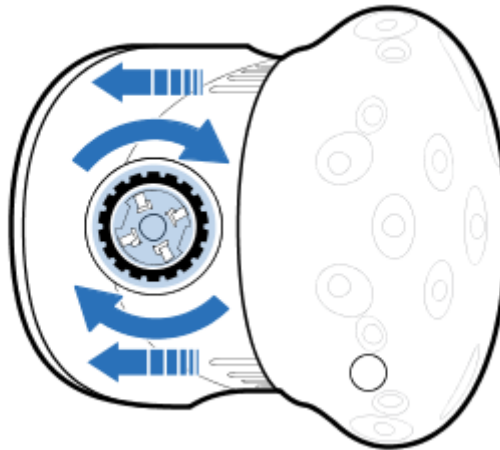
When adjusting the headset, a window pops up and displays the actual distance between the center of the glasses. It's important to adjust this interpupillary distance (IPD) to see correctly the different virtual elements in the headset.

2.1.2 Glasses Distance

If you wear corrective glasses, you can adjust the move away of the glasses by pulling the buttons located on both sides of the headset.



Once it is unlocked, turn the buttons for adjusting the glasses closer or further from your eyes.



Note: increase the distance only if it's necessary. Indeed, closer are the glasses to your eyes, better will be your field of view when you use the headset.

2.2 Lighthouses

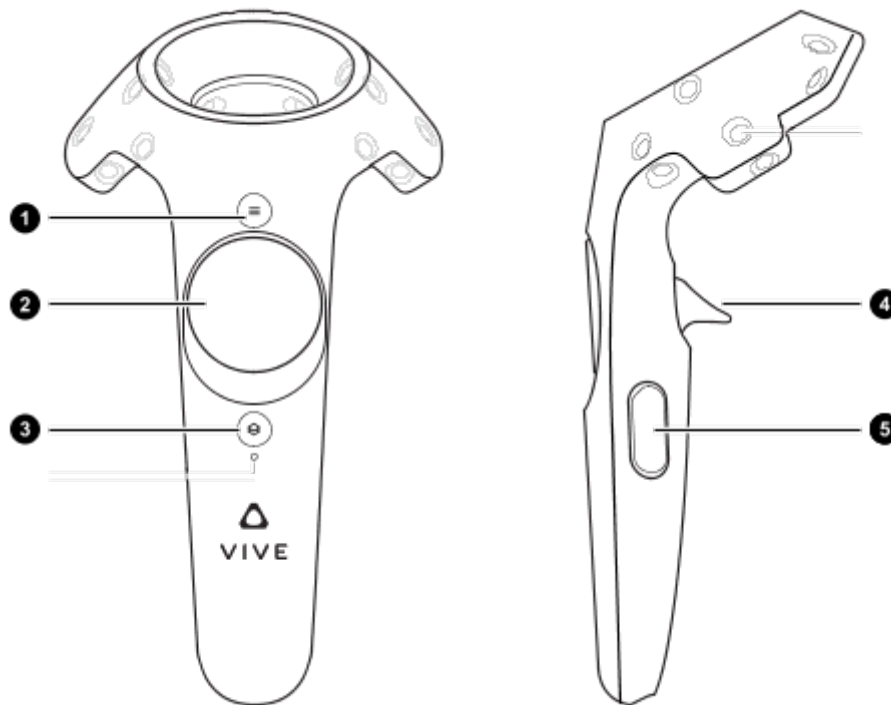
There are 2 lighthouses delivered with the **Vive**. Those are infrared lamps to estimate the headset and controllers position spatially.



2.3 Controllers



The **Vive** controllers are represented in the picture above. The main functionality is to interact with objects in the virtual space.



There are have 5 actuators:

- 1) Top button (menu button),
- 2) The trackpad (button and analog joystick),
- 3) Bottom button bas (bouton de system),
- 4) The trigger,
- 5) The input/grip button (located on each side of each controller)

For **VIRTUAL INDUS**, the right and left controllers represent the two virtual hands.



Figure 1 – Virtual hands in VIRTUAL INDUS

Each controller has its own functionalities concerning the menu **button (1)**. The left one is used to display the configuration screen named “Help”. You cannot modify this button.



Figure 2 – Controller keys configuration Interaction

To set off interactions with the key interface and some of the buttons in the virtual space, hands must move to point something out. A laser will appear, at the extremity a cylindrical target.



This target represents the impact point of the laser on a virtual object.

If the interaction with the target is allowed in the virtual space, you can interact with the tactile interface, pressing the buttons or remaining pressed on the **trigger button (4)**.

When the object is interactive and can be catch, it becomes green with the contact of the hand.

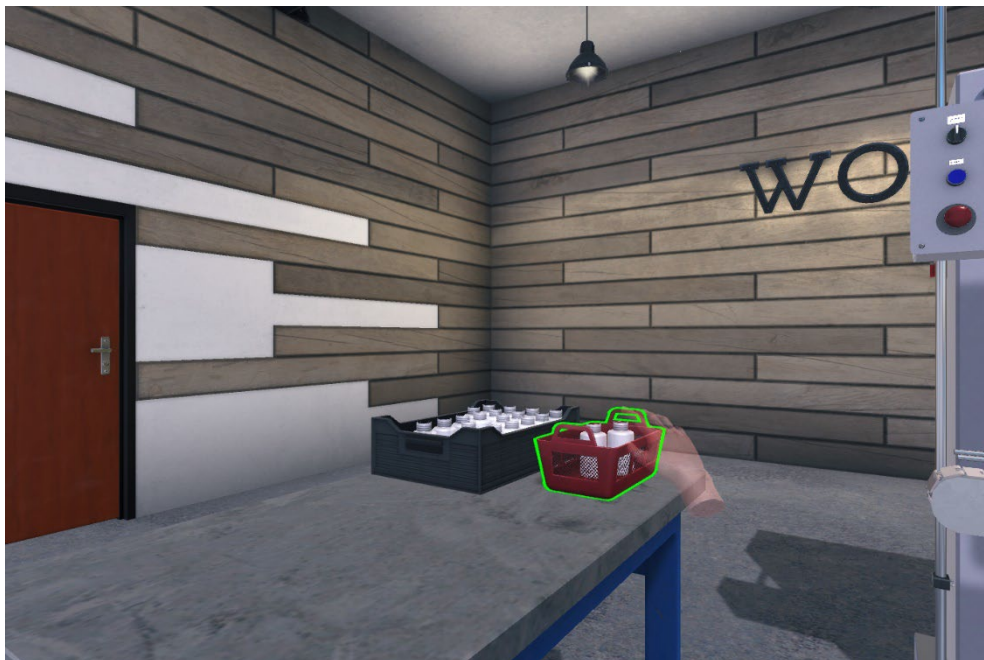


Figure 3 – Interactive basket

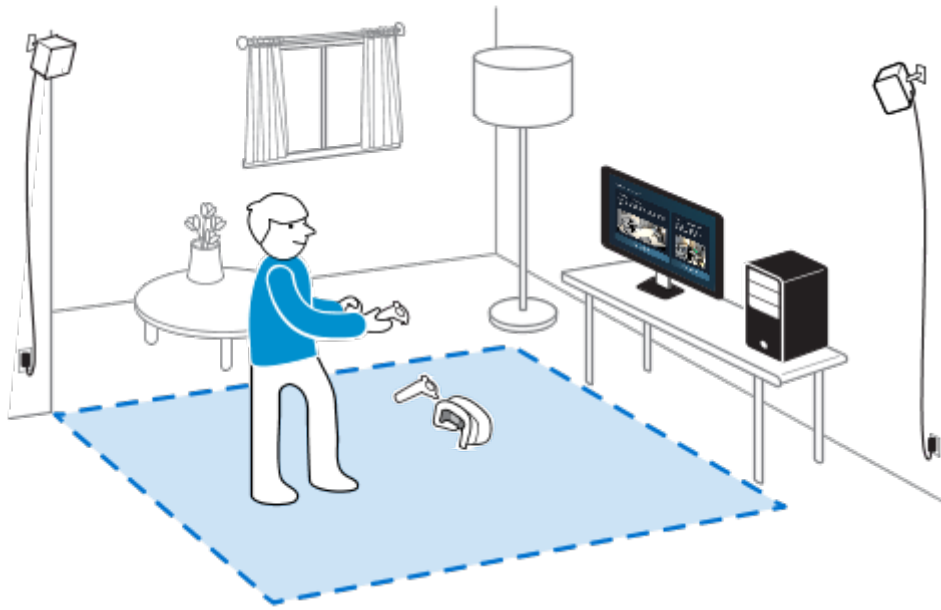
Some object can be grabbed and moved. Once those objects are on hand, you must stay pressed on the controller. The hand visual will disappear and only the object representation will remain. A blue ghost indicates where the object can be dropped.



Figure 4 – Basket interacting

2.3.1 Teleportation

Teleportation is a way to move in the virtual space of **VIRTUAL INDUS**, allowing the trainee to deal with physics constrains of virtual space called "room-scale". When you get close to the room-scale border, a grate path appears to warn you.



By pressing the **touchpad (2)**, you can activate the teleportation option. As long as the button is pressed, you can choose to teleport yourself. When you release the button, the teleportation will be effective. You can cancel the teleportation if the touchpad is not release, by pressing the **grip button (5)**.



Figure 5 – Visuals display during the teleportation

A parabolic and discontinuous pointer will be visible. It represents the path crossed during a teleportation. If the teleportation is accessible and possible; the pointer will appear in **blue**; otherwise, it will appear in **red**.

When the teleportation is possible, the exact landing place is represented in **orange** surrounded by a **green** square. The green lines will represent the room-scale limits.

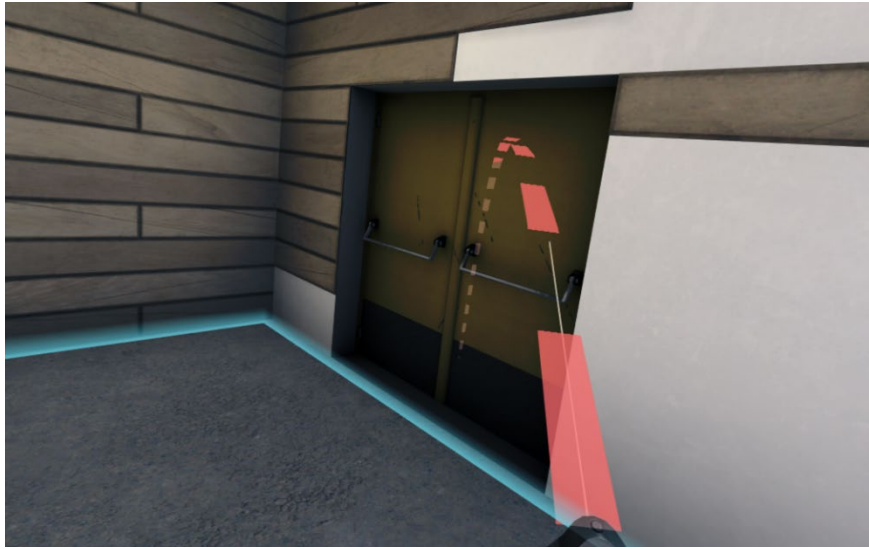


Figure 6 – Teleportation cannot be made across walls

The blue gleams that border the room represent the limited zone where you can move and teleport during the simulation.



Figure 7 – Possible moving zone

2.3.2 Zoom

Activate the zoom by pressing the **input button (5)** on the right controller. Deactivate it by releasing the button.



Figure 8 – Distant

Figure 9 - Zoom interface

2.3.3 Screenshot

When an exercise is ON, you can do screenshot by using the **menu button (1)** on the right controller. A



sound indicates that the screenshot is done.

Those are save in a "Records" file. A shortcut is automatically created on the desktop when the simulator is installed. It is in the "Virtual Indus" file, Start menu.

2.4 Moving

2.4.1 Virtual Workshop

This is a 3D rectangular virtual space where the trainee will work on different industrial and electrical procedures.



Figure 10 – Virtual Workshop

The virtual workshop floor defined the moving space available for the trainee.

2.4.2 Walking

You can walk in the available Virtual Indus space by taking care not to tangled with the cable of the Vive and bumping in the different obstacle of the room-scale.

2.4.3 Teleportation

The other way to move is the teleportation. It works as explain in the **Teleportation chapter (2.3.2)**.

2.5 Virtual Screen



Figure 11 – Main Virtual Screen

Virtual Indus virtual screen appears in the virtual workshop. The screen automatically adapts to the height of the trainee.

In this interface, the trainee can log in and launch exercises according to his/her pedagogical curriculum.

2.5.1 Connection to VULCAN

If the connection is not detection or Internet is OFF, the following message appears:



In that case, the trainee has 2 options:

- Try to reconnect if you are sure that the computer is connected to Internet
- Continue with the off line mode

Using the option #2, the system will use a local database of Vulcan including users. Their curriculum, results will not be register in the online database.





2.5.2 Parameters

The image below represents the setting bar of the virtual screen:




Figure 12 Setting Bar

The setting bar has the following icons:

-  Languages
-  Volume
-  User Log out
-  Disconnect

Before the exercise, the following icon appears

-  Recording

This is an option that allows recording the exercise.

Activating this option can deteriorate the performance of the system, depending on how powerful the computer is.

When the recording option is activated, a "REC" indicator appears in red on the tablet.

*Finally, videos are recorded with a poor resolution to reduce the storage corkacity of **Virtual Indus**. Videos*

are saved in the “RECORDS” file, as well as screenshots.

Figure 13 – Video Recording Activated

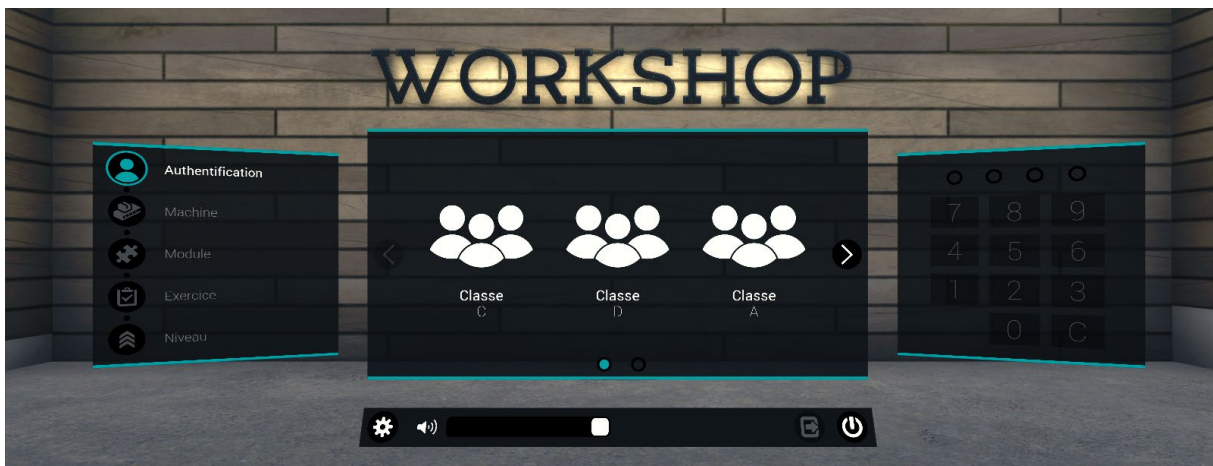


2.5.3 Authentication

The first step when using the virtual screen is login. Two steps: choosing the class then the trainee.

2.5.3.1 Choose a class

When choosing the class, you see the following interface:



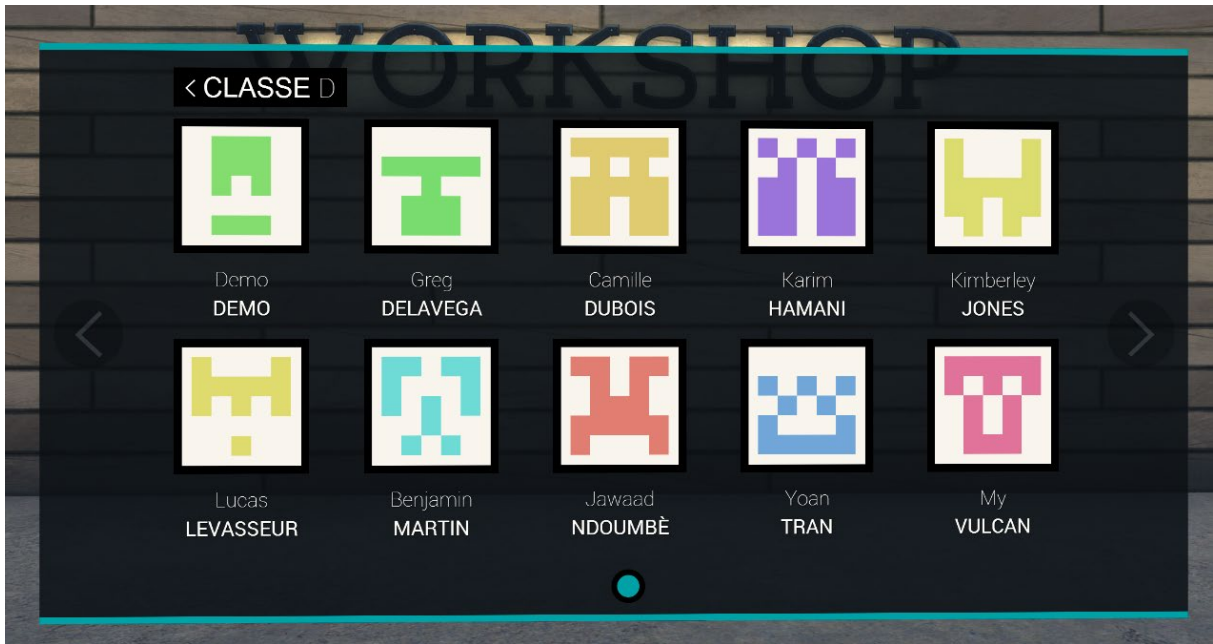
Class name appears under each class icon. This name is limited in terms of typeface and once the limit is reached, the class name will be cut and followed by "...".

At the bottom of the screen, the small dots represent the number of pages available. In the figure above, we notice two pages. To go on the second page, click on the right arrow. A maximum 3 classes are display per page.

Note: To navigate on the virtual screen use the trigger on one of the controllers.

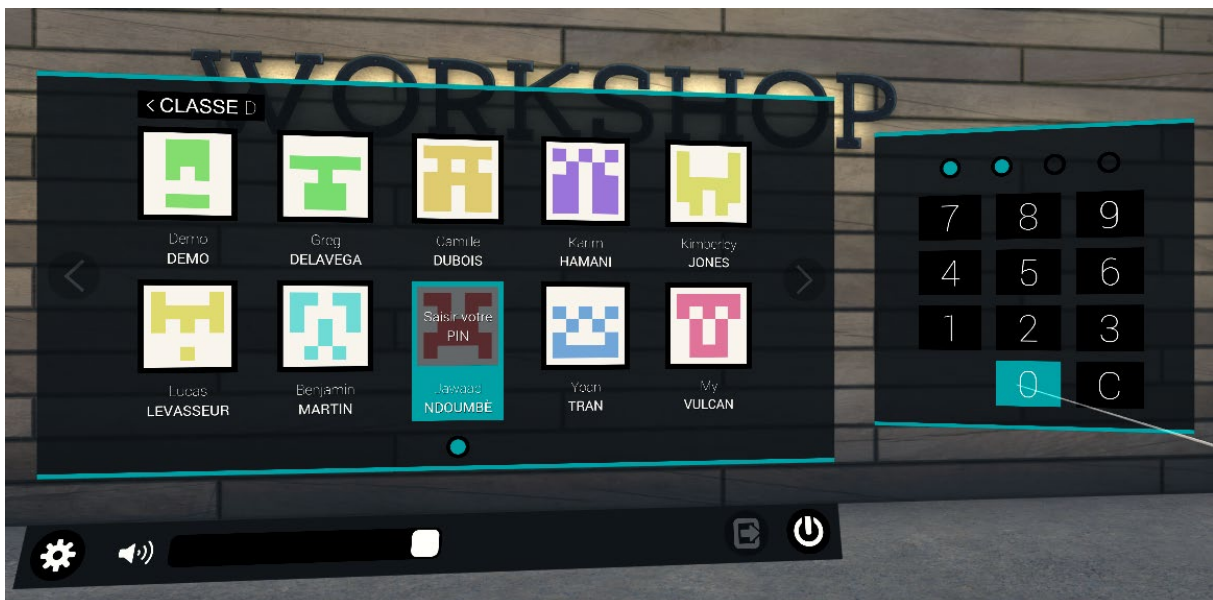
2.5.3.2 Choose the trainee

After selecting a class, the trainees registered are display as below:



To browse between the trainee's pages, select the right arrow. To go back on the class choice, you must select the button "Class" located on the top of the screen. Maximum 10 trainees are displayed on each page.

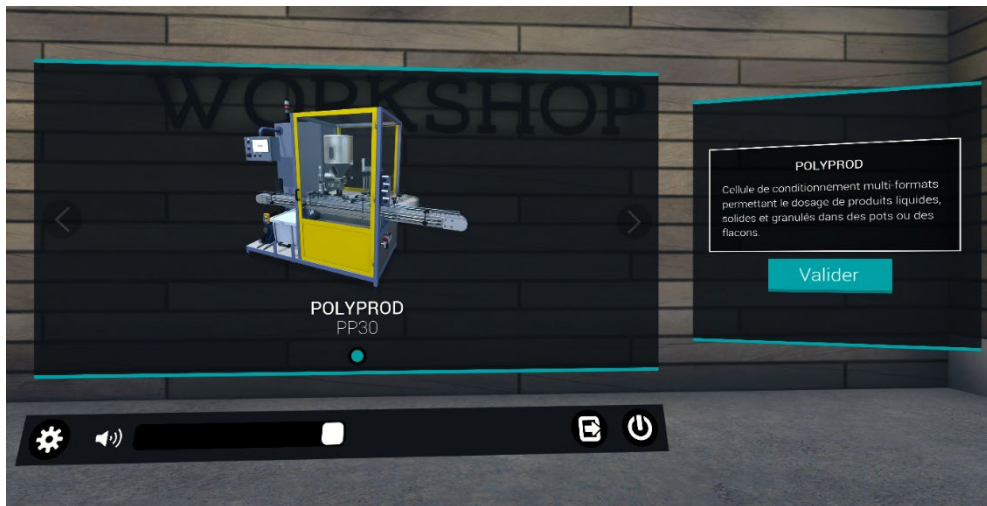
When selecting a trainee, the right keypad is activated, and you can enter the PIN code associated to finalize the authentication:



2.5.4 Selecting a Machine

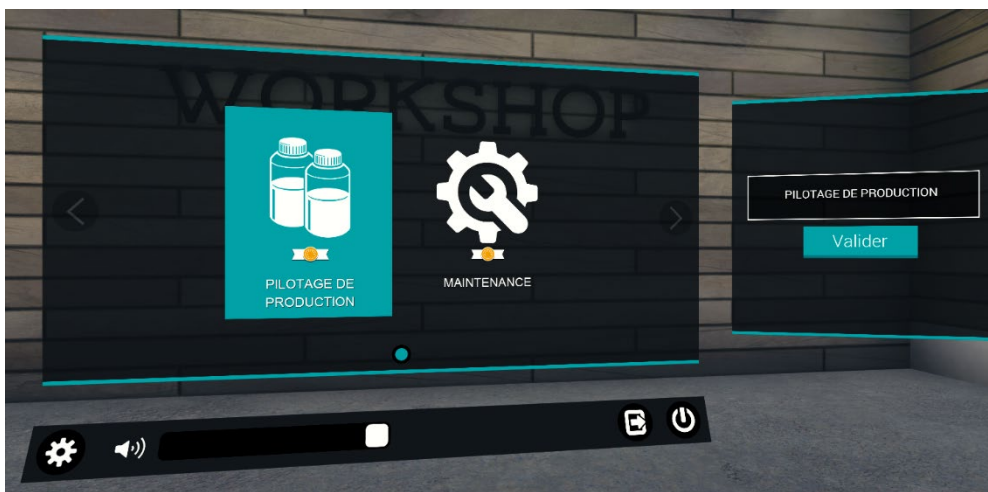
Choose the machine you want to use, works only with the **free curriculum mode**. A small description of the machine is displayed on the right side of the screen. Select the machine by pressing **Valider**.

One machine is display per page. Validate the section by clicking on the image. The process is the same for the following selection (exercises, levels, modules).



2.5.5 Selecting a Module

The available modules are displayed according to the chosen machine. Maximum 3 modules are displayed per page.



Under each module, 3 possibilities:

- No icon: the trainee never did the exercise of the module
- Yellow icon: module is in progress
- Green icon: the module is done

No Icon

the trainee never did the exercise of the module



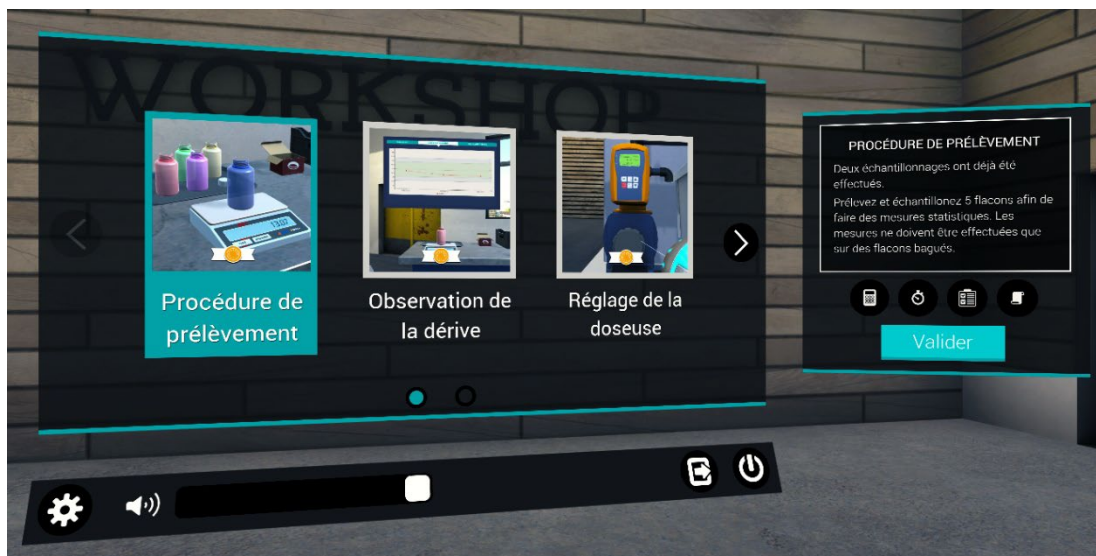
At least one level or sequence of the module has been launched or validated. In progress



All sequences of the module are validated. The module is done.

2.5.6 Selecting an Exercise

The available exercises are displayed. A brief description of each exercise is available on the top right as well as evaluation criteria.



An icon indicates if at least one level of the sequence has been launched or all level validated.

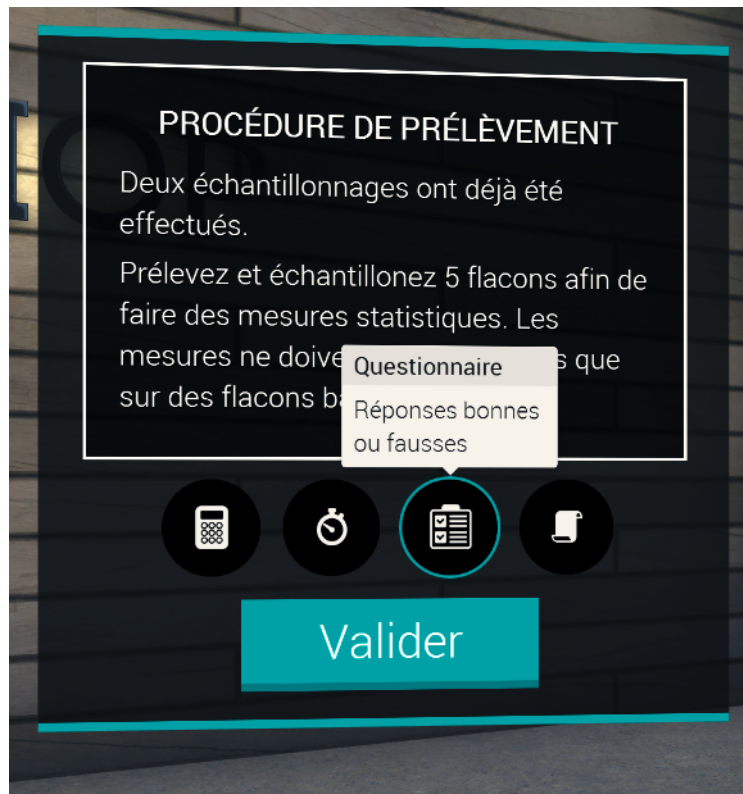
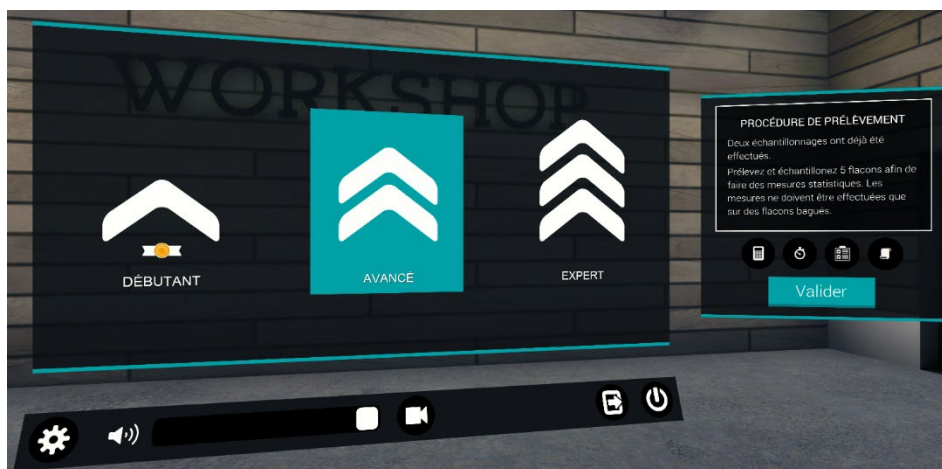


Figure 14 – Evaluation criteria of a sequence

By clicking on the icon of each criteria, you can see its detail.

2.5.7 Selecting a Level

Once you choose the exercise, you must select the level:



Each level of each sequence has several assessment criteria progressively harsher. Processes have less and less instructions.

At some **BEGINNER** level, only one part of the sequence must be completed to realize the first handling.

After launching the exercise, the main virtual screen disappears, the interface appears on the right or left harm of the trainee (you can define the position before).

The laterality of each trainee is modifiable through **VULCAN** or can be changed temporarily for an exercise.

2.5.8 Table of Contents

The contents page appears on the left side of the main virtual screen. It sum up exercise steps before launching it.

You can use the previous step. For changing the

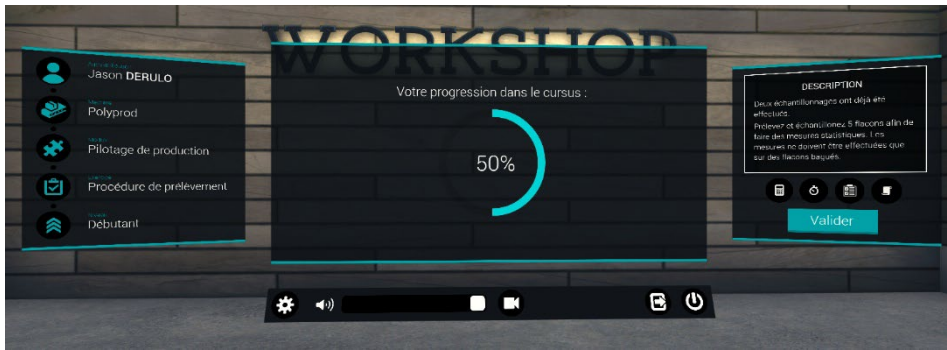
In a prescribed have the choice of the exercise level.



contents table to come back to instance, choosing a level or machine.

2.5.9 Prescribed Curriculum

curriculum the trainee doesn't machine, module, sequence or



The curriculum progression is displayed by a circular gauge. The next exercise description and the evaluation criteria are displayed on the right side of the screen. The table of content sums up the machine, module, exercise and level of the exercise that need to be done. When doing imposed curriculum, the trainee cannot do the second exercise if the first one is not realized successfully.

2.5.10 Results

When an exercise is done or exit before the end, results are displayed on the main virtual screen. The workshop is cleared from all information, and the virtual screen displays the results (possibility to find those results on VULCAN).

«**SUCCESS**» or «**FAIL**» will appear according to results.

According to the success percentage, 1 to 3 stars appear filled up on the left side of the screen. The execution time is also displayed. For some sequences, the time can be an evaluation criteria.

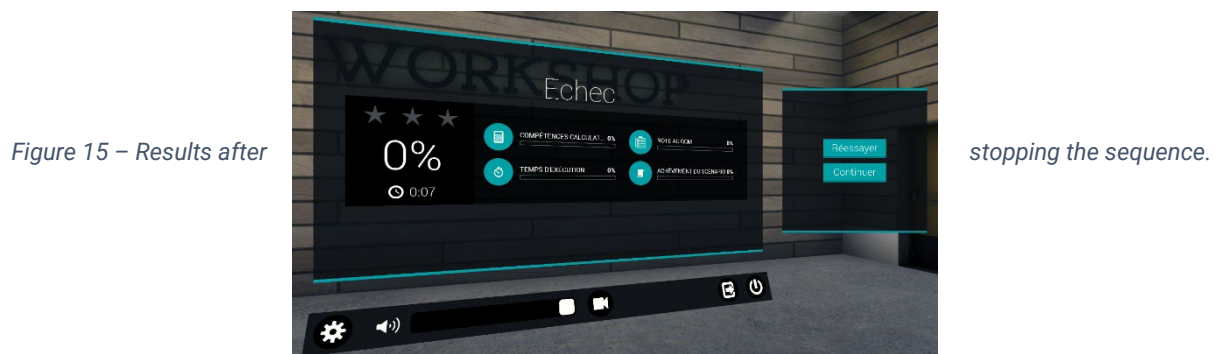


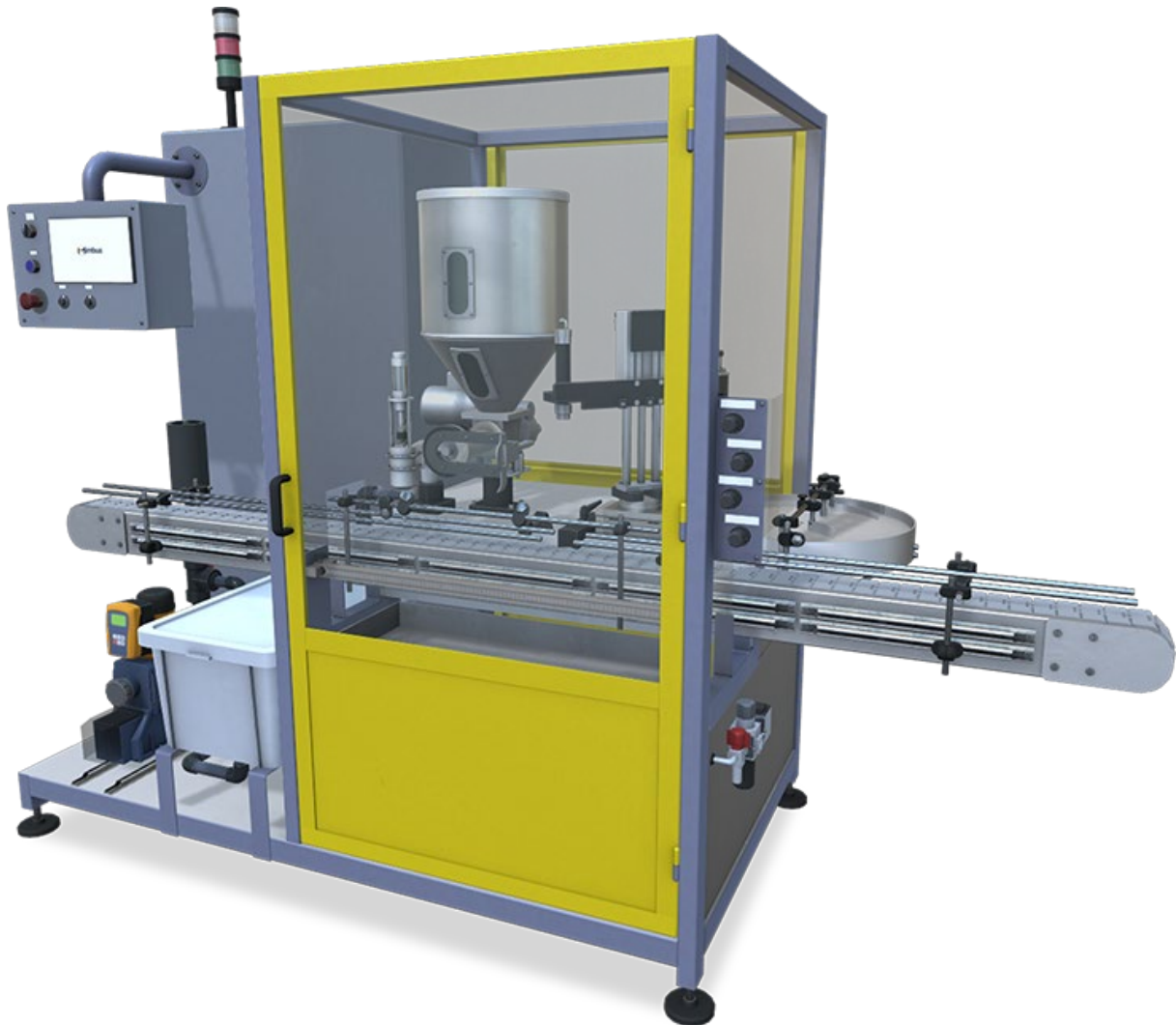
Figure 15 – Results after

stopping the sequence.

2.6 POLYPROD - PP30

Knowledge requirement: normality zone, enhance surveillance zone, out of control zone, drifting code

The PP30 is a multi-format processing cell that allows to dose liquid, solid or granulate products. The liquid can be packed in pots or flask with screwing cork.



2.6.1 Desk

Alike a real machine, a screen appears on the reading desk.

This screen allows to initialize the machine, switch it on and off and manage parameters.



Figure 16 - Reding desk screen of the PP30

2.6.2 Power Supply

To operate, the machine is supply by **electric and pneumatic energy**.

The main electric supply can be logged or unlogged with a 2-position rotary switch.



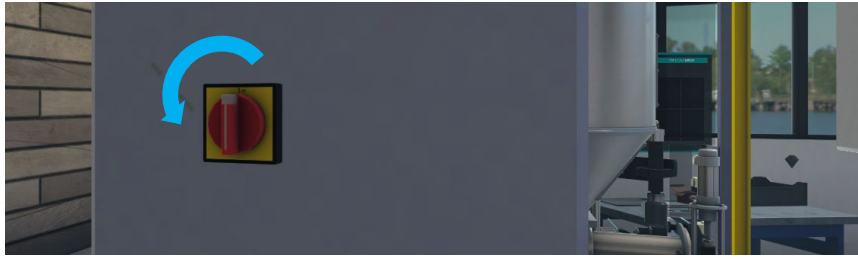


Figure 17 -Maine Electric switch

The switch is located on the left side of the machine, when facing the machine.

When log in the main power supply, the machine will stop working, the screen turns off and you must initialize the machine by turning it on.

2.6.3 Pneumatic Supply

The pneumatic supply may be logged or unlogged with a 2-position rotary switch.



The switch is located on the right side of the machine, when facing it.

When login the main pneumatic supply, the machine will stop working and engage an emergency stop that is notify on the desk screen.

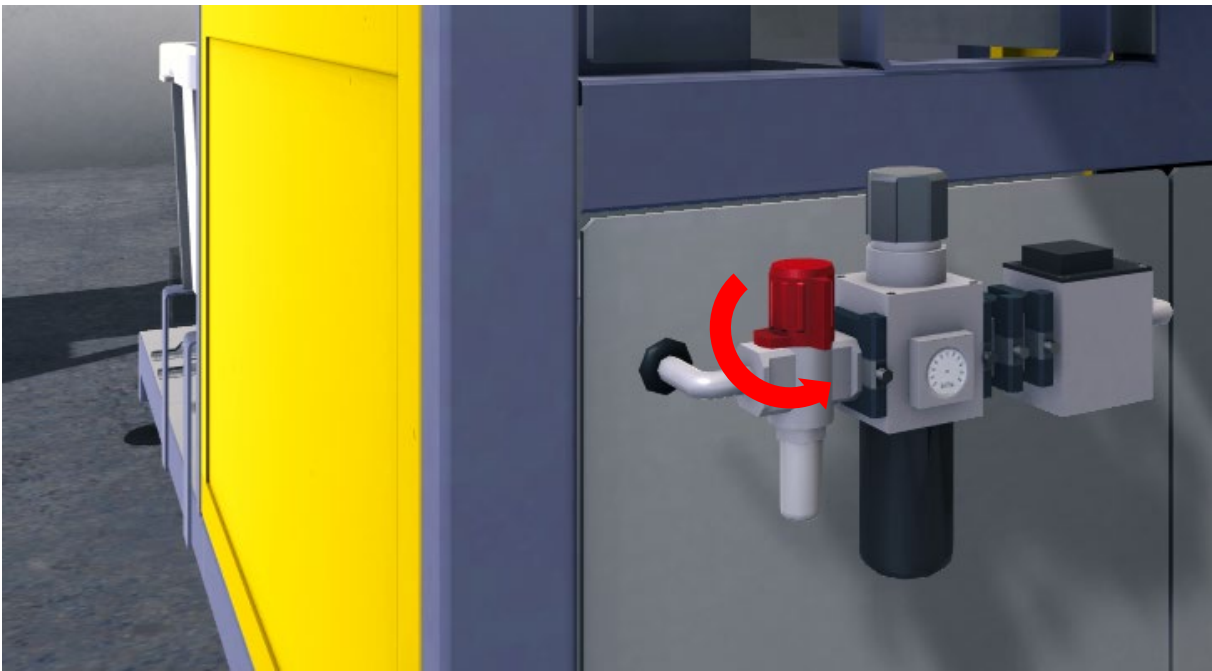


Figure 18 – Pneumatic supply switch

2.6.4 Dosing Pump

The dosing pump is located on the Polyprod frontage.

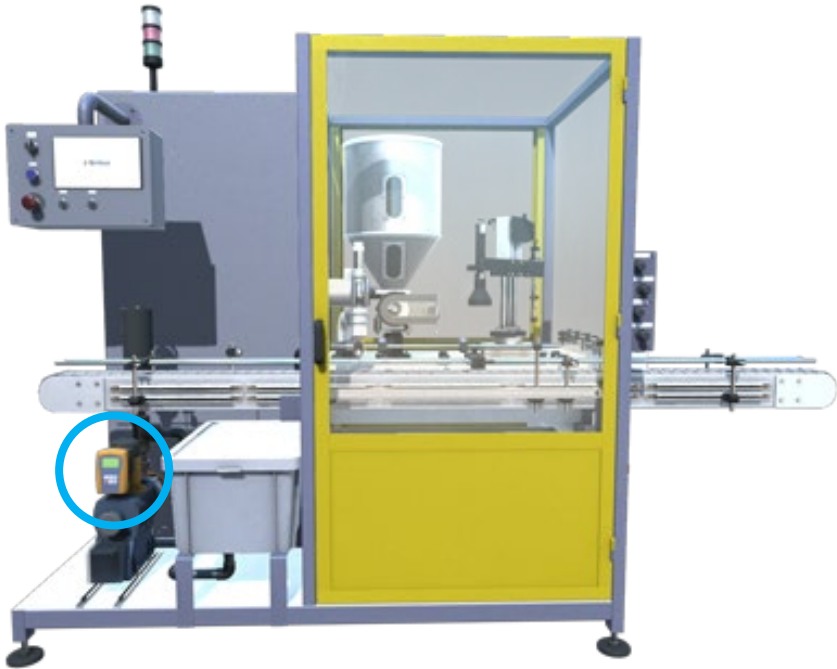





Figure 19 – Dosing pump


To adjust the dosing pump, turn the grey spanner adjuster.

2.6.5 Details of Desk Screen

On the desk screen, you can access the machine configuration parameters.



POLYPROD 

Paramétrage 1  

Recette : 0

Contenant : Flacons ▾

Produit : Liquide ▾

Liquide

Volume dose : 100 ml

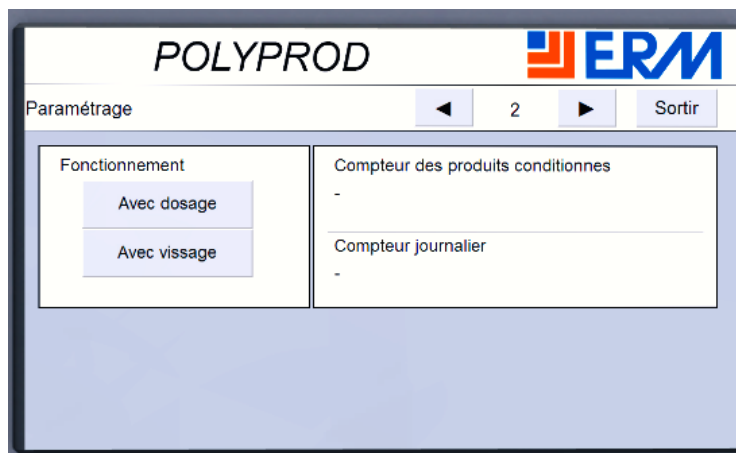
Réglage à faire sur la pompe : 80 %


Réglage offset : +0




Granulé

Tours de vis : 7 tours

You can manage the recipe (number of pots, flask to produce), content, product, and the calculation.



POLYPROD 

Paramétrage  2  

Fonctionnement

Avec dosage

Avec vissage

Compteur des produits conditionnes

-

Compteur journalier

-

The second page of parameters allows you to choose if the machine will work in **deteriorate** mode or not (**with or without dosing, with or without screwing**).

On the main page you can initialize the machine, it will turn on the conveyor during a certain amount of time.

We can also turn the machine on and off.

Starting the machine activates the dosing and screwing process.

When the machine is stopped, it will still finish the ongoing process/action before stopping the conveyor.

When an emergency stop is required by pressing the **hardline** red button, the machine stops its ongoing activity and notifies the emergency stop on the desk screen.

2.6.6 Indicator Lights

The indicator lights are located on top of the machine and indicate the operational status of the machine



Figure 20 – Indicator lights when the machine works properly

When the machine is on the deteriorate mode, the green diode is blinking.



Figure 21 – Screwless mode

When the emergency button is pressed, the light turns red.

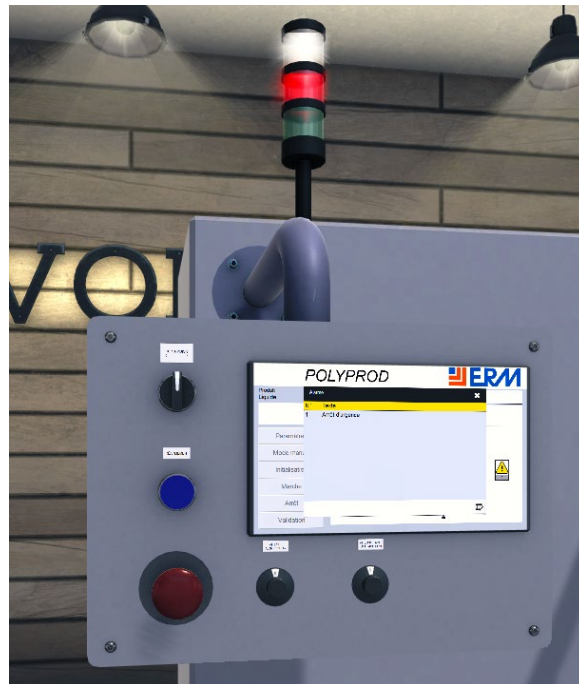


Figure 22 – emergency stop pressed

When the electric supply is logged, all diodes are off.

2.6.7 Conveyor belt, screwing and dosing.

When the machine is turn on, the conveyor brings the different flasks to the different station of the machine; dosing and screwing of corks.



Figure 23 – Flasks conveyance

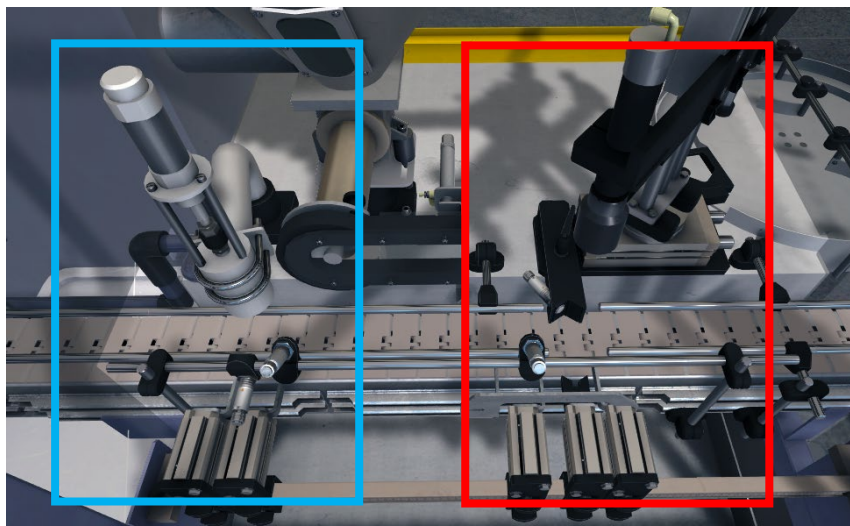


Figure 24 – **Dosing** and **Screwing** of corks

When 1 flask arrived at the dosing station, the others are stopped and stayed on the waiting line.

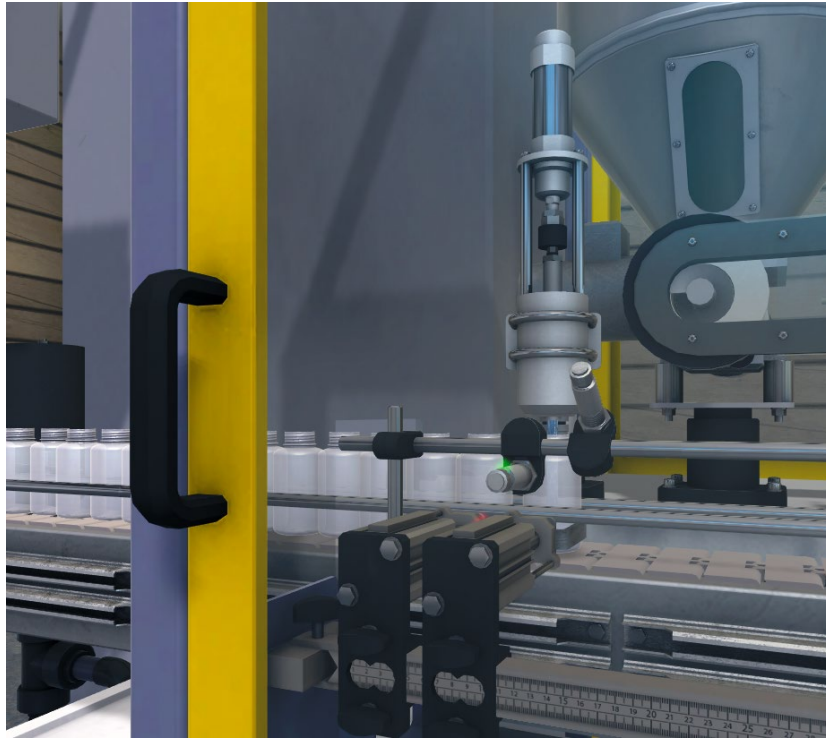


Figure 25 – Dosing a flask

When a flask is at the screwing station, other flasks are hold on the waiting line.

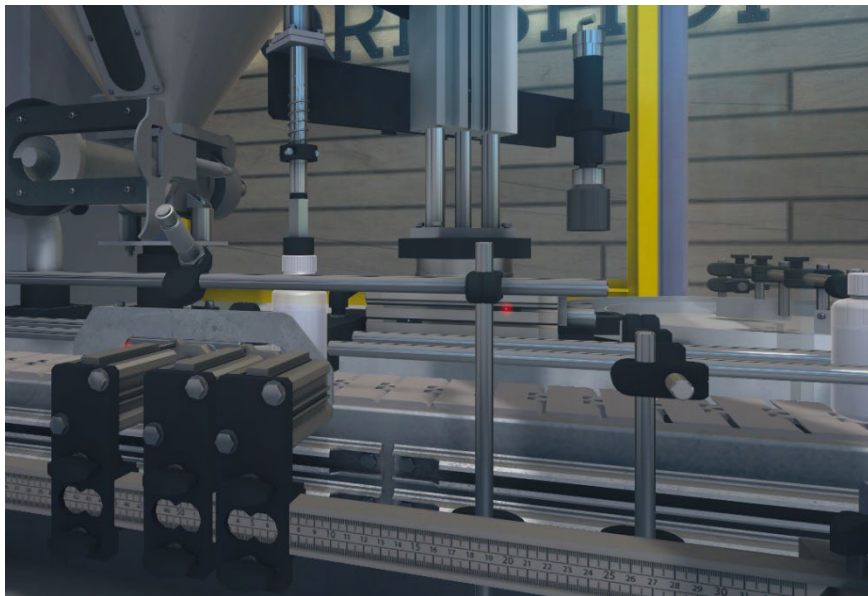


Figure 26 – Screwing a flask cork



Figure 27 – Overview of the machine

2.7 Tablet

Once the exercise is launched, the tablet appears on the non-dominant hand of the trainee. This laterality is defined in VULCAN and can be modified anytime.



For instance, while simulating, you can change temporarily the laterality and the tablet position.

The exercise length appears on the tablet as well as:



One icon representing the chosen laterality. You can change it by clicking on the left or right hand.



One exit icon that allows quitting the ongoing exercise.

When recording the video, the '**REC**' notification appears on the tablet.

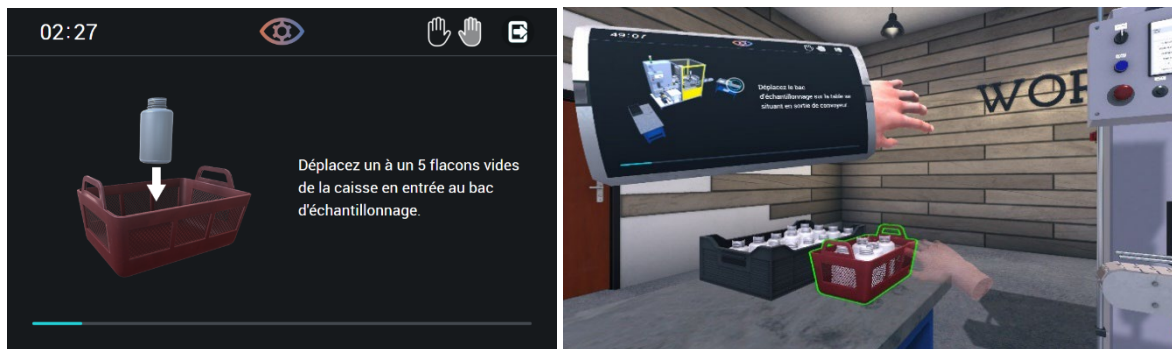
At the bottom part of the tablet, a gauge indicates the different steps validated.

3. SEGMENTED INTRODUCTIONS

3.1 Module 1: Production Control

3.1.1 Sequence 1: Sampling Procedure

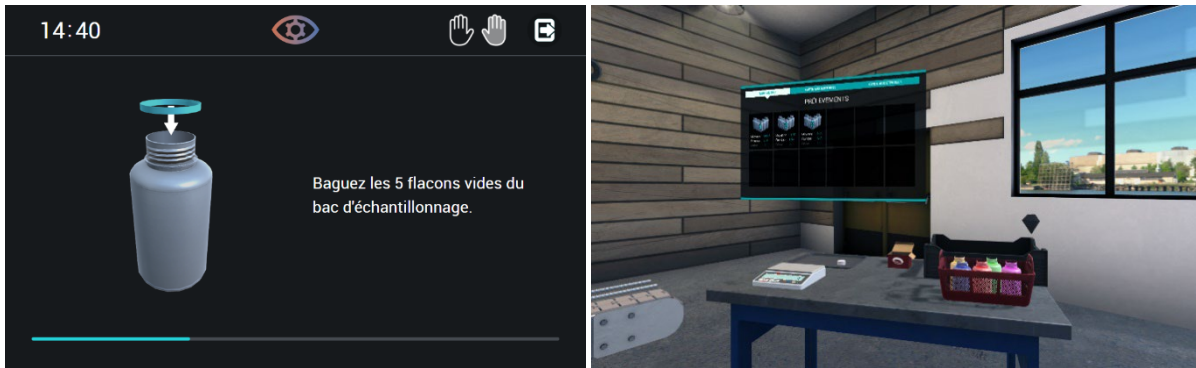
The first sequence: get use to sampling



This step consists in moving randomly 5 flasks of the black supply vat to the red one, called the sampling vat.



As mention, you need to move the sample tray into the indicated space (on the table-right side). Those steps are only available for the **BEGINNER** level.

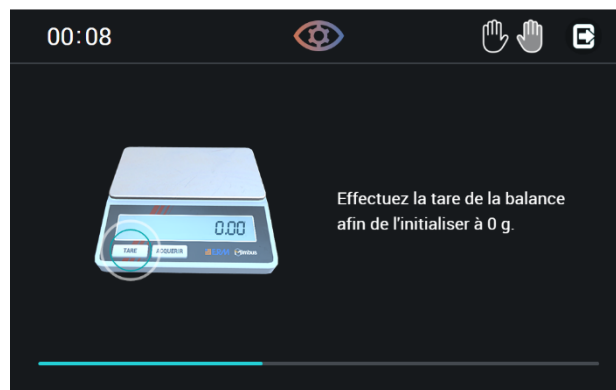


To band a vial, you need to interact with the band box located on the main table.

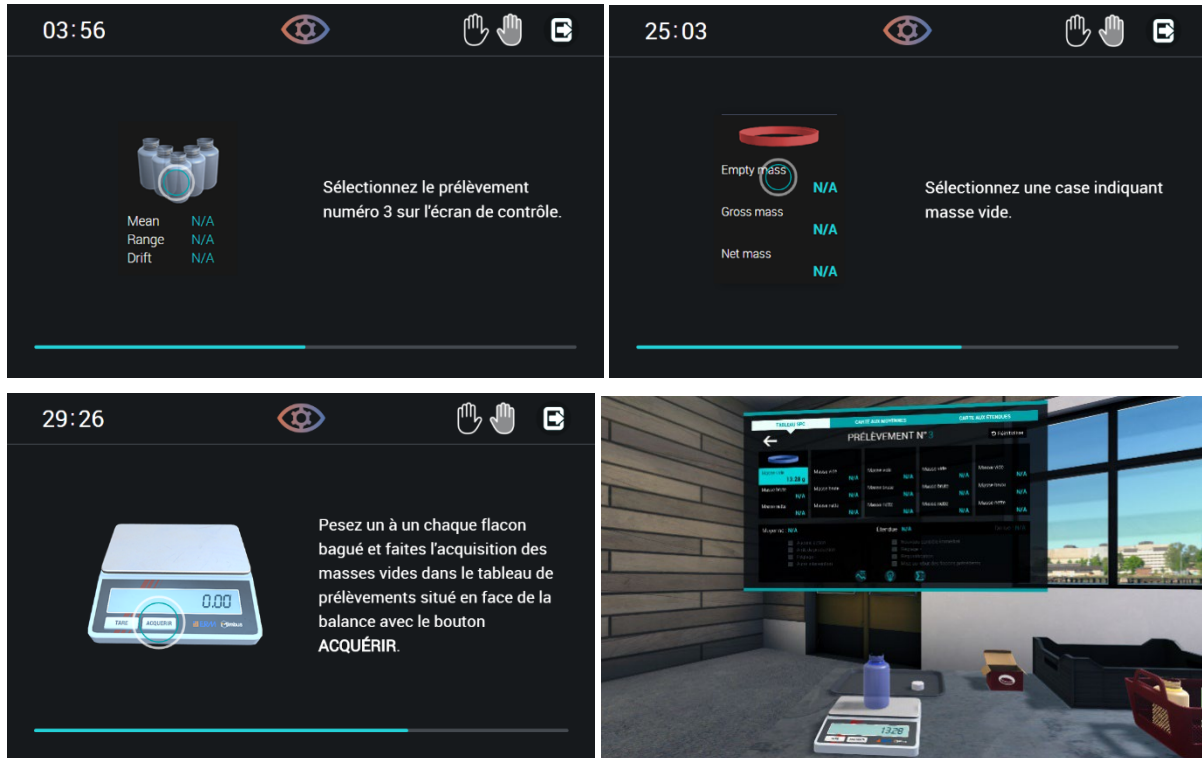


Figure 28 – Band box

After, a band will be linked to a controller, you need to collide the flask with to band it. Put back in the red vat.



Before initializing the scale, 'X' appears on the screen. You must initialize it by pressing the 'TARE' bottom of the balance. The '0.00g' appears, given that nothing is on the scale. If you initialize the scale with a flask on it, the 0 value will be reference value on the scale.



Select sampling number 3: enter the empty for each sample, click on the next box to enter a new weight.

In the example above, the blue empty mass of the flask has been acquired by pressing the button "Acquire" on the scale. Before, you must weigh the banded vial and select the empty mass cell.

Next assignment: weigh the cork in front the scale, click on 'acquire' and drop it back where to picked it up.

To do so, make the red vat interact with the black case (left table) by pressing and releasing the trigger. All flasks of the sampling vat get transfer to the case and go on production automatically.

Then, you can start the machine and the bottle will fill up and you will be able to obtain the gross weight: Pick up the bottle at the end of the production line from the black box: weigh each of the bottle on the scale and click on 'Acquire'.

Remove the rings by putting the bottle in the band case. Choose the right drift. Remove his helmet to start the exercise.

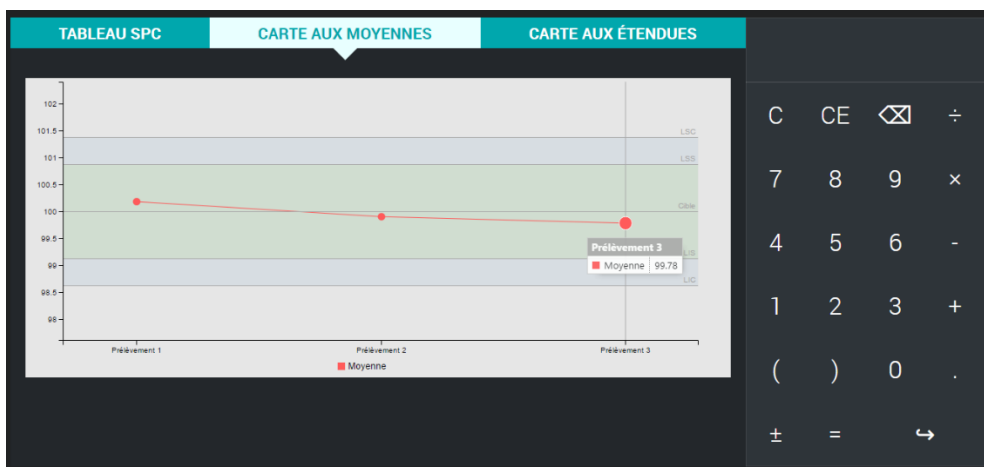
Note: removing the vial band is an optional step for the higher level.



The trainee must calculate each band vial gross weight, the average weight and the extent.

Use the calculator next to the sampling tab. The formulas are available on the third tab when starting from the left. To enter the results, do the calculation and click on the arrow.

Once the calculation is done, the trainee must select the averages map. Dots represent the sampling average, same for the extents.



After selecting the right dot, the trainee must answer an MCQ.

25 : 03

QUESTIONNAIRE À CHOIX MULTIPLES

Question 1
 Dans le contrôle statistique par échantillonnage que vous venez d'effectuer,
 L'échantillon désigne :

- Un ensemble de 5 flacons prélevés sur la ligne
- Une opération bancaire
- Un flacon qui a été prélevé sur la ligne

Suiv ➤

● ○ ○ ○ ○ ○ ○ ○

Answers to the MCQ are the following:

Q1: For the sampling statistic control that done, the sample is:
➔ a set if 5 bottles sampled from the production
Q2: For the sampling statistic control done, an individual is:
➔ One of the sample's bottle
Q3: Before weighting the flasks, you must take it with the cork. Doing a tare is:
➔ not taking the cap's weight into account
Q4: Why should we weight and notice the 5 empty flasks before controlling?
➔ Because each the empty bottle did not weight the same
Q5: On the control map, the dots representing the sampling average must be:
➔ the closest possible from the middle line
Q6: The extent of the following (100,32; 98,50 ; 101,80 ; 99,68 ; 100,54) is:
➔ 3,3g
Q7: On the extents map, it's better if:
➔ the points are very low

The MCQ is the 1 step of sequence 1.

The trainee can see the exercise replay + answers of the MCQ (pdf located in a file > 'RECORDS')

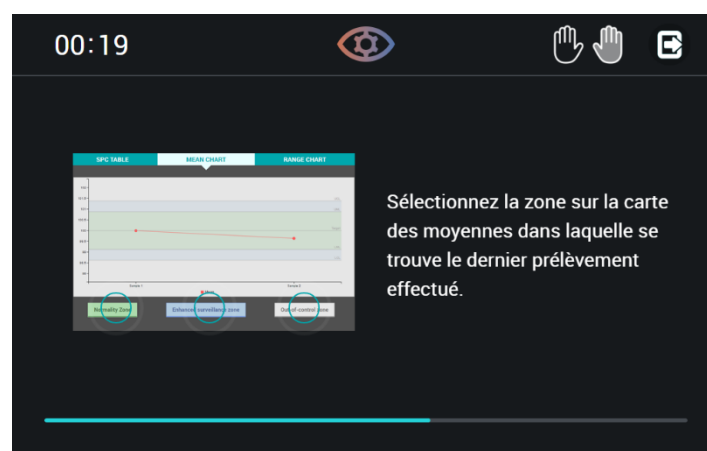
3.1.2 Sequence 2: Drift Observation

BEGINNER level of sequence 2 is a shorter version of the **ADVANCE** and **EXPERT** level.

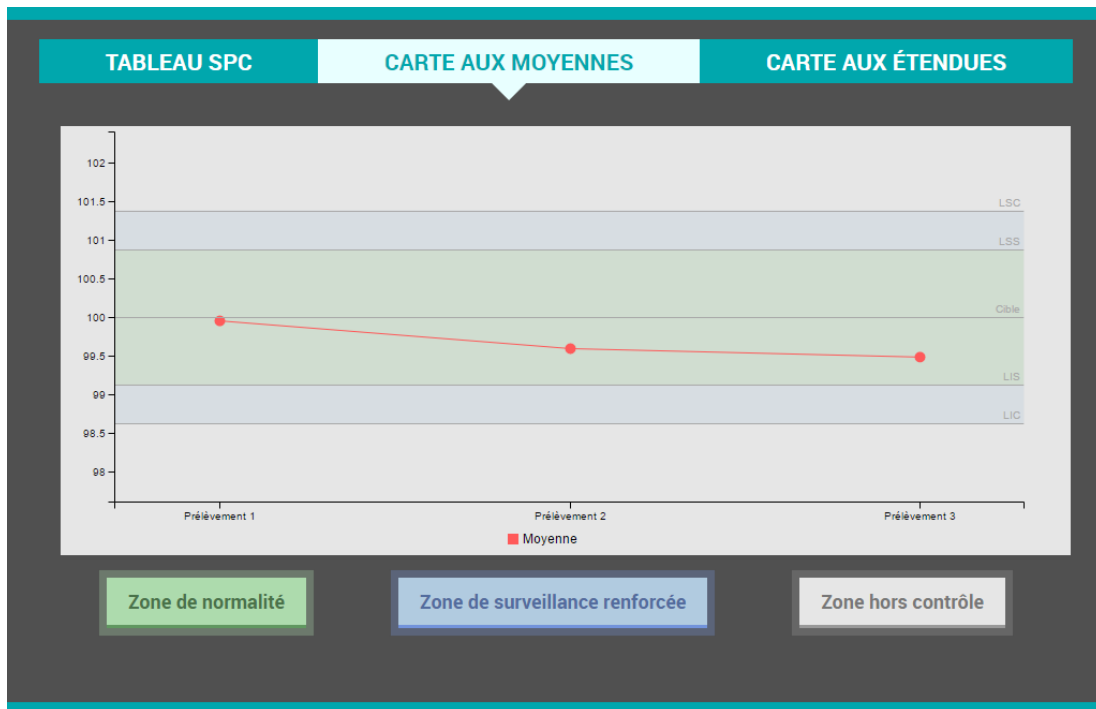
The sequence starts with a sampling: banding of 5 empty vials (take the band from the box and attached them to each bottle), select sample number 6, highlight the first box take a bottle, weight it and put it back on the red vat, highlight the next column and so on. After obtaining all the empty weight, tare of the cork, bring back the red tray to the front of the assembly line and put them in the black box. Start the production of the banded bottle.

acquire of gross weight; highlight the right column that match with the color of the sample.

Removing the band of the bottle.



Calculation is done automatically, then the trainee must select the dot that represent the average + the extent of the sampling.



You must select the dot of the corresponding zone, where the sampling has been done. This step cannot make the trainee fail, if there is a mistake, the trainee is notified and can try again.

The following assignment is to enter the drifting code corresponding to the sampling situation. The trainee can use the drifting code tab that associate each code with a precise situation.

For instance, if the sampling average is in the blue zone (reinforce control zone), and the previous sampling was not, the drifting code of the actual situation is D1-.

At BEGINNER level, the drifting code is notifying in bold on the drifting code tab.

CODES DES DÉRIVES	
Codes	Descriptions
HC+	Un point au-dessus de la limite supérieure de contrôle (zone hors contrôle).
HC-	Un point en dessous de la limite inférieure de contrôle (zone hors contrôle).
D1+	Un point entre les limites de surveillance et de contrôle (zone de surveillance renforcée).
D1-	
D2+	2 points sur 3 entre limites de surveillance et de contrôle (zone de surveillance renforcée).
D2-	
D6+	6 points consécutifs ascendants ou descendants.
D6-	
D9+	9 points d'un même côté de la cible.
D9-	
D14	14 points alternativement ascendants ou descendants.
D0	Normalité

Figure 29 – Drifting codes

Once the drifting code is indicated, the trainee need to tare the scale with 0 weight in to remove the cork tare. Then, the trainee can start another sampling and determine the drifting code.

One last sampling is required before passing to the situation D2 and show a negative drift.

The trainee interacts with the machine element and correct the drift.

Go to the machine front and adjust the dosing pump – it must be higher.

Then, answer an MCQ (answers below):

Q1: In the statistical sampling control you did the drift designates
 → A downward trend in the mean

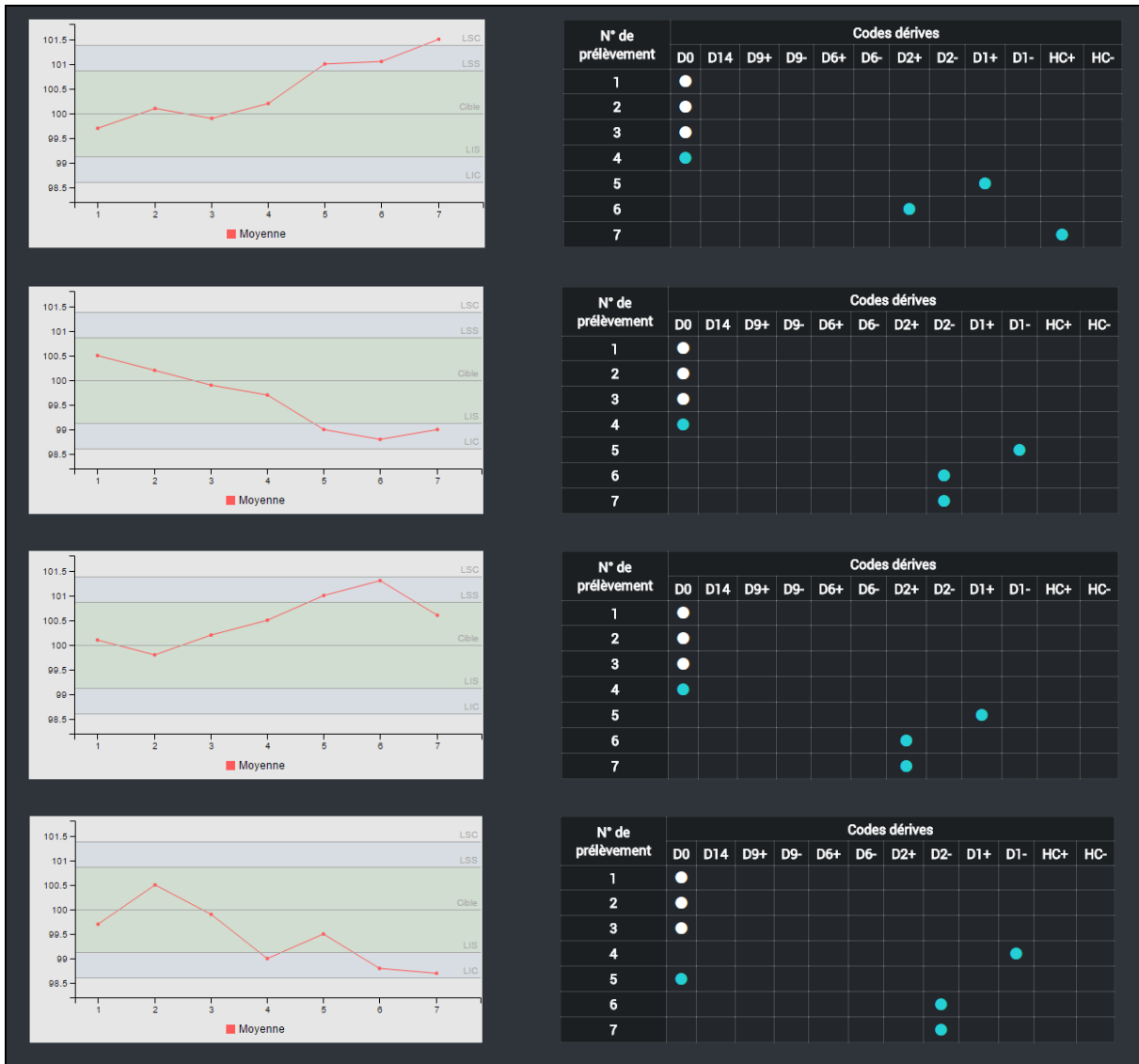
Q2: The enhanced surveillance zone is
 → Between the upper monitoring limit and the upper control limit

Q3: Why is it necessary to anticipate drifts?
 → TO take cation before the production of non compliant product

Q4: On the control chart at the averages below, identify the drift situations by completing the table for Samples 4 to 7 :

La carte de contrôle affichée varie aléatoirement entre différentes situations préenregistrées





3.1.3 Sequence 3: Dosing Pump Adjustment

At **BEGINNER** level the sequence 3 is a shorter version of the ADVANCE and EXPERT level.

At **ADVANCED** level have only one sampling less than the EXPERT one. The drifting code must be determined during sequence 2 and indicated after each sampling.

The sequence starts with a sampling: after indicating the drifting code matching with the actual situation, the trainee can do a second sampling. After determining the drifting code, the trainee must use the decision helper tab and decide of the action to take.



Figure 30 – Decision tab

First: pick 5 sample bottles from the beginning of the production line and place those in the red tray. Bring the train to the other table (right side) and band the bottle (bring the ring to the bottle).

Initialized the scale by clicking on 'Tare'. Select a sample on the screen, highlight the box you want and weight the bottle to enter the empty mass. Weight the cap located in front of the scale. Take back the red tray to the production table, put it in the black basket. Bottle are going on production by itself.

Pick the bottle and weigh the gross weight of each, unband the bottle and put them back on the black basket.

Do 2 more samples – same steps than described before.

In the **D2+/-** situation, the trainee must intervene to compensate the drift, as explained at the end of sequence 2.

In the **HC**- situation, select the following action to take: settings, production shutdown and recalibration. Then, you must calculate the setting amplitude to modify the dosing volume of the dosing pump.

00 : 25
INSTRUCTIONS

En utilisant l'illustration ci-dessous, calculez l'amplitude du réglage. Vous pouvez également consulter d'autres ressources techniques. Le réglage doit ramener la moyenne sur la cible.

Amplitude du réglage = Valeur cible - Moyenne

AMPLITUDE DE RÉGLAGE :
-0.15
mL

Réglez la pompe à environ 99 mL

Terminé

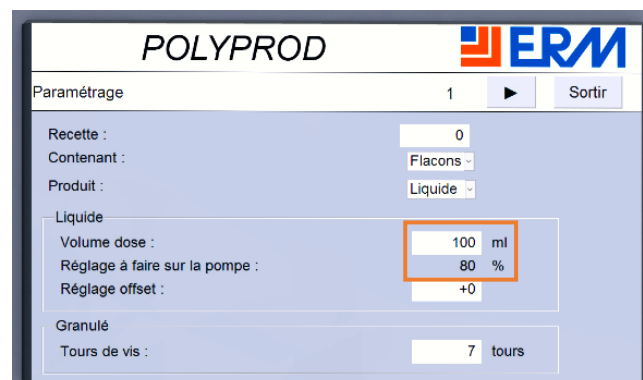
-0.15

C	CE		÷
7	8	9	×
4	5	6	-
1	2	3	+
()	0	.
±	=	↩	

The interface where you calculate the setting amplitude helps the trainee by giving calculation formula (amplitude and dosing pump setting). A **green arrow going** from the last sampling to the target value is also displayed. Calculation: **target value – mean value**

When coming back to the virtual reality environment, the trainee can access the machine parameters and enter the volume value of the dosing pump.

The percentage to set is given. The trainee can adjust the dosing pump to decrease the drift.



A new sample is requested, and the trainee notes the effect that his setting has had on the volume dosed in the bottles. He/she is then invited to wait a certain time to symbolize a temporal ellipse.

After the ellipse, are processes, and a D2+/- situation appears. The trainee must intervene to compensate the drift, as explained at the end of sequence 2.

Then, he/she must calculate the setting amplitude to modify the dosing volume of the dosing pump.

3.2 Module 4: Production Management 2

3.2.1 Sequence 1: Qualification of the dosing machine

In this sequence, the aim is to become familiar with the qualification procedure of the dosing machine. This is to ensure that the dosing machine has been properly commissioned and that it will be able to perform its function under reliable conditions and within specifications.

At the very beginning of the sequence, you are asked to read the order in which it is packaged. This can be seen on the screen to the right of the Polyprod. The aim is to deduce the setting value of the Polyprod dosing machine from this packaging order.

The setting value is equal to *the net mass* + *the overdose mass*, i.e. 100.5g for the BEGINNER and ADVANCED levels, 125.5g for EXPERT.



Throughout the exercise, it is possible to display a calculator by tapping on an icon at the bottom of the screen. The calculator, once displayed, can be hidden by clicking on the arrow at the top of the screen.

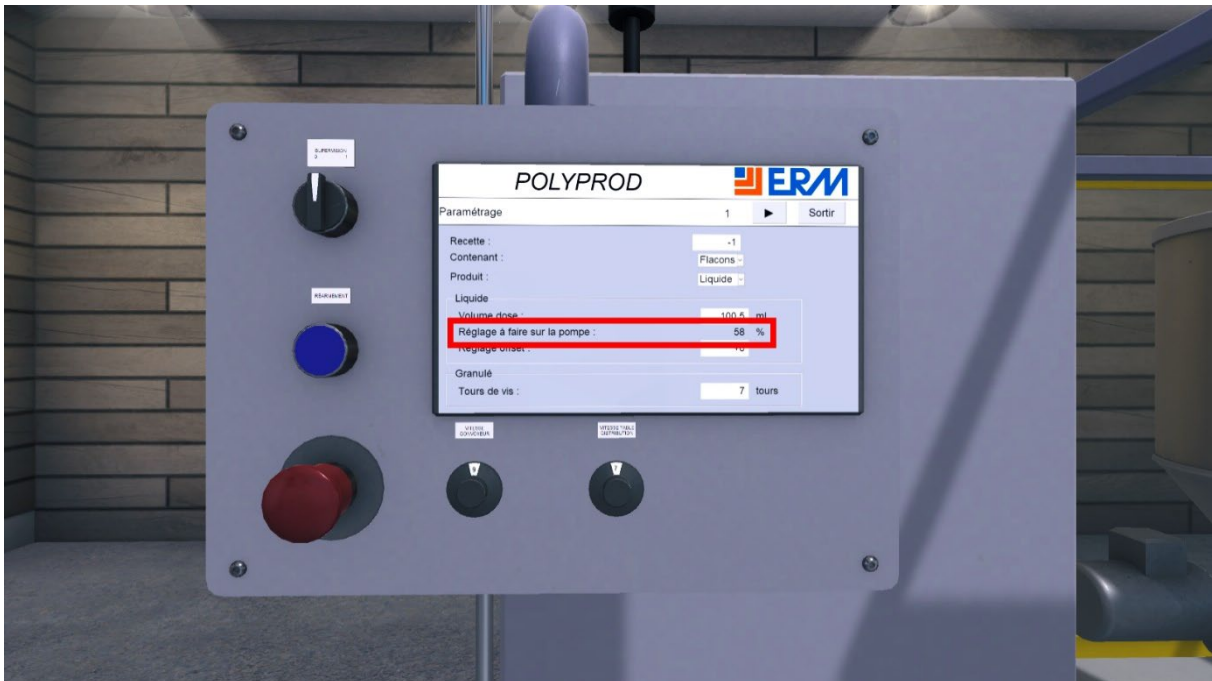


The value previously deducted from the packaging order must now be entered on the Polyprod console. First, you need to open the settings menu and enter the volume in the box to the right of the text "Volume dose". The value can be entered on the virtual keyboard of the open popup window. The expected value is 100.5g for BEGINNER and ADVANCED levels, and 125.5g for EXPERT levels.





The adjustment to be made on the pump then appears on the Polyprod console to the right of the text "Adjustment to be made on the pump".



The dosing pump must then be adjusted using the dial to the setting previously provided on the console. The setting is expressed as a percentage. Grasp the knob and turn it in the correct direction, then release it once the desired value is reached.



The next step is the "collective tare" of the scale. Place an empty jar and a cork on the scale and press the "Tare" button on the scale.



The machine must be turned on and a vial must be removed. To validate the step, you have to take a bottle from the Polyprod machine and place it on the scale. If the seized vial has not been produced with the current machine settings, a message warns the user that the entered jar is not valid for the current step.





The mass of the vial is incorrect, it is not in the range $100.5\text{g} \pm 1\text{g}$ (in BEGINNER and ADVANCED level) or $125.5\text{g} \pm 1\text{g}$ (in EXPERT level)

Once the jar is placed on the scale, a question appears on the screen just above it.

What do you decide about the setting of the dosing machine?

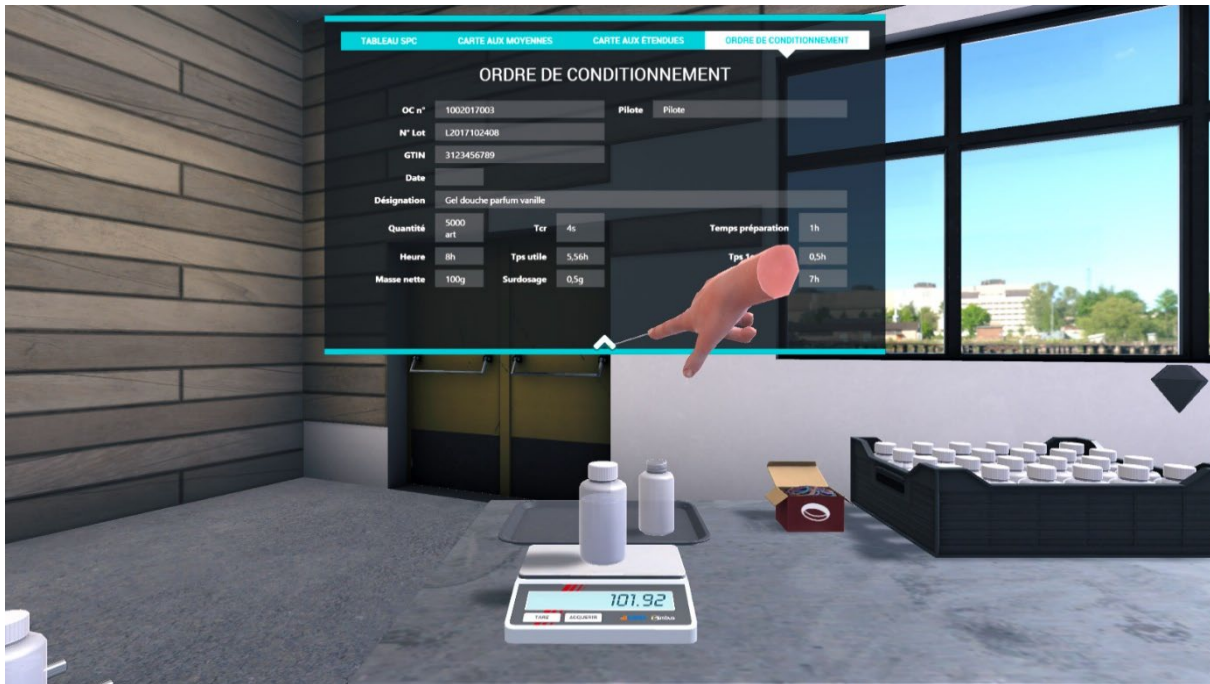
- **Unsatisfactory Setting: Make a new adjustment**
- Satisfactory setting continue qualification procedure

Since the mass is incorrect, the correct answer is the first one: Unsatisfactory setting.



It is possible to collapse the window containing the different questions by tapping on the arrow at the top of the screen, to access the page of averages or samples. It is then possible to redisplay this window by pressing the arrow, this time at the bottom of the screen.





The dosing machine must then be re-adjusted, taking into account the mass of the jar placed on the scale, using the following formula:

If the mass of the weighed pot is greater than the target mass:

New Setting = Old Setting – (Weight of Weighted Jar – Target Mass)

For example, in our case, if the mass of the pot is 101.92g:

New setting = 100.5 – (101.92 – 100.5) = 99.08g

If the mass of the weighed pot is less than the target mass:

New Setting = Old Setting + (Target Mass – Mass of Pot Weighed)

For example, in our case, if the mass of the weighed pot is 98.3g:

New setting = 100.5 + (100.5 - 98.3) = 102.7g

A calculator can be shown or hidden on the screen above the scale by tapping the calculator icon.

The new setting value must be entered as before in the parameter menu on the Polyprod console. The first step is to stop the machine if it is running.

The step is only validated when the correct value, corresponding to the new setting calculated using the last pot weighed, is entered on the lectern.



The pump must then be set to the value displayed on the console using the dial. This value is expressed as a percentage and the step is validated when the pump is set correctly.



If the scale has been reset since the last weighing, it is necessary to redo a collective tare before weighing a new pot.

You are then asked to fill and remove a vial. As before, it is a matter of starting the machine and grabbing a jar from the Polyprod.

This jar must now be placed on the scale.

The mass of the last weighed pot is correct and is in the range 100.5g +/-1g (in BEGINNER and ADVANCED level). At EXPERT level it is necessary to readjust the pump and check until the mass of the weighed pot is within the desired range (125.5g +/-1g).

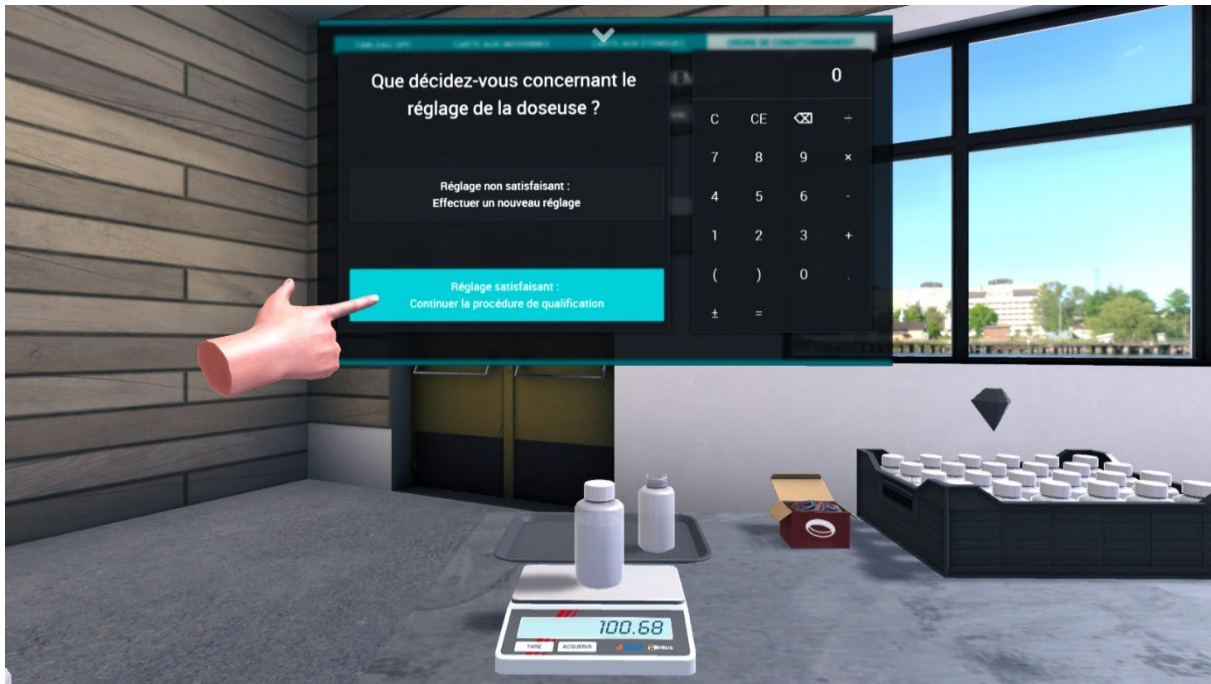


A question appears on the screen just above.

What do you decide about the setting of the dosing machine?

- *Unsatisfactory Setting: Make a new adjustment*
- **Satisfactory setting continue qualification procedure**

Since the mass is correct, the correct answer is the second: Satisfactory setting.



It is then requested to weigh 5 vials in accordance with the SPC procedure, broken down into several steps:

You need to ring 5 empty vials. The rings can be picked up from the small box near the balance and placed on empty vials previously placed in the red sample tray.







The mass of the empty ringed jars must now be recorded. To do this, you must first press the "TARE" button on the scale to reset it to 0 and then select a new sample on the screen above the scale.



You must then place the jars on the scale in turn and press the "ACQUIRE" button by selecting a box indicating empty mass each time until you have weighed the 5 empty ringed vials.



The scale must then be tapped with the cap on the tray next to the scale. To do this, simply grab it and place it on the scale, press the "TARE" button and place it back on the tray.



The 5 ringed vials must now be deposited in the case at the entrance of the Polyprod.





The Polyprod must be turned on. It is then necessary to select the *gross mass* boxes corresponding to each incoming vial and acquire the ringed vials by placing them on the scale and then pressing ACQUIRE.



Once all the gross masses have been acquired, the rings must be removed from the jars: each ringed jar must be grasped and released on the ring box. The vials can then be deposited in the tray at the outlet of the Polyprod.



The machine can now be stopped.

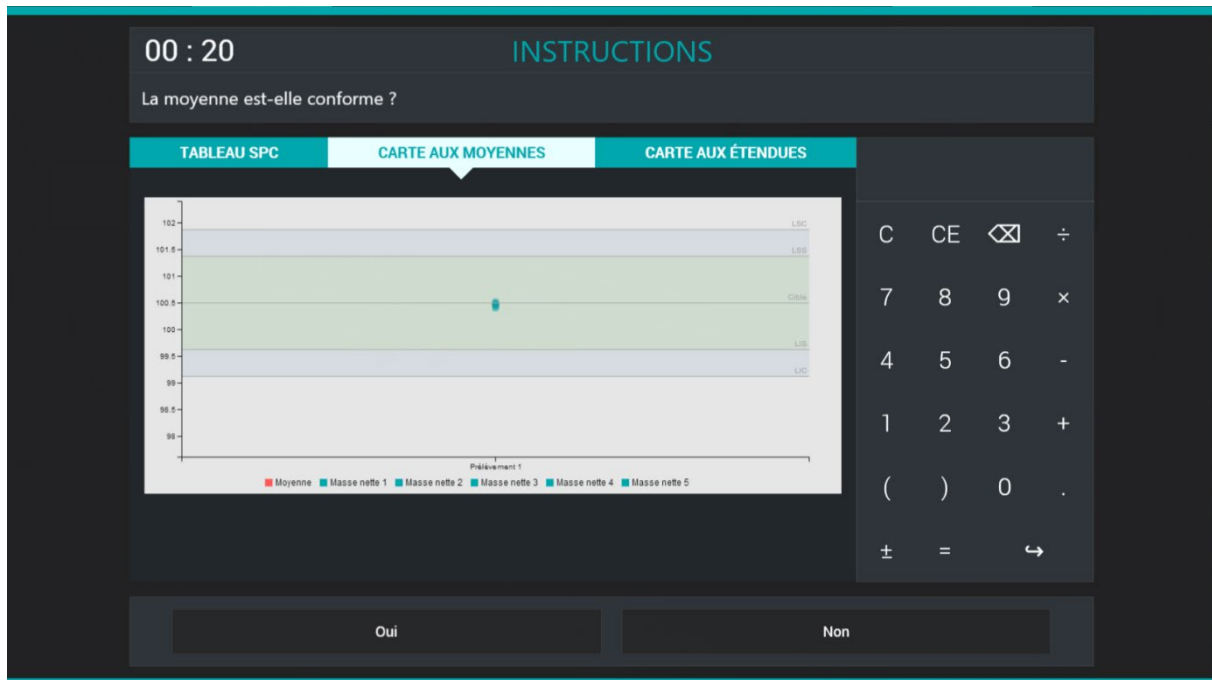


In BEGINNER level the average mass of the pots acquired is correct (in the range 100.5g +/-1g), however in ADVANCED level the average of the masses is incorrect, the rest of the scenario differs according to the level of difficulty.

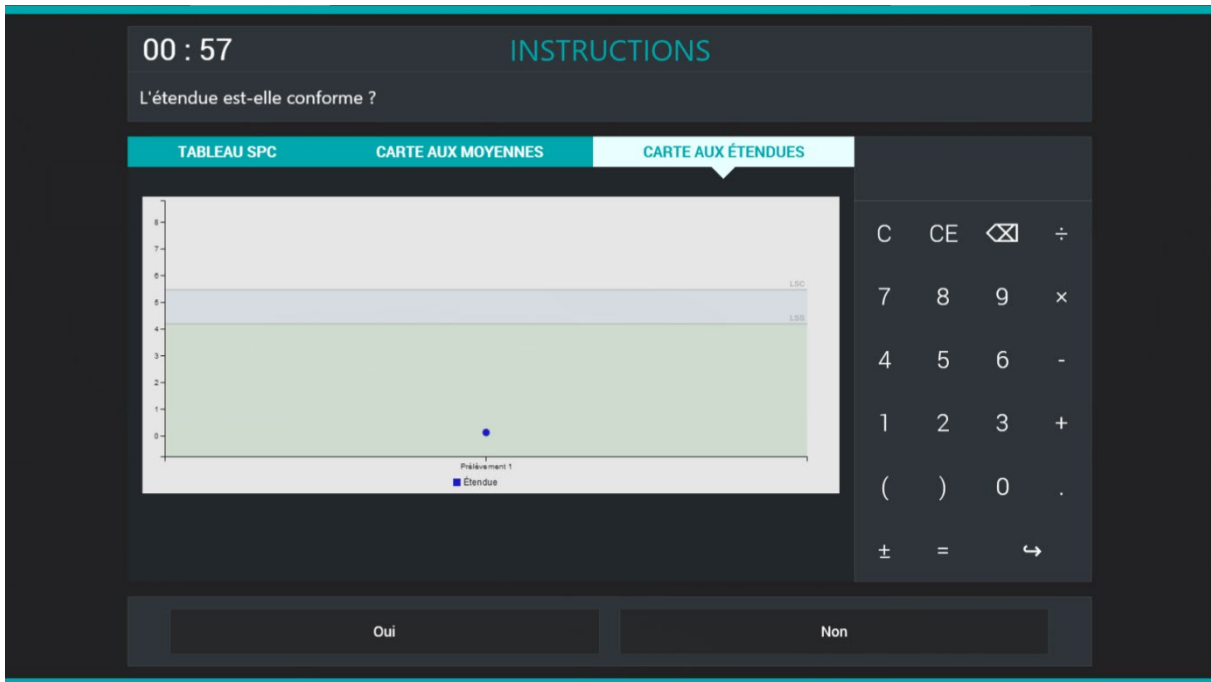
3.2.1.1 BEGINNER Level

You will then be asked to remove the headset to answer the following questions:

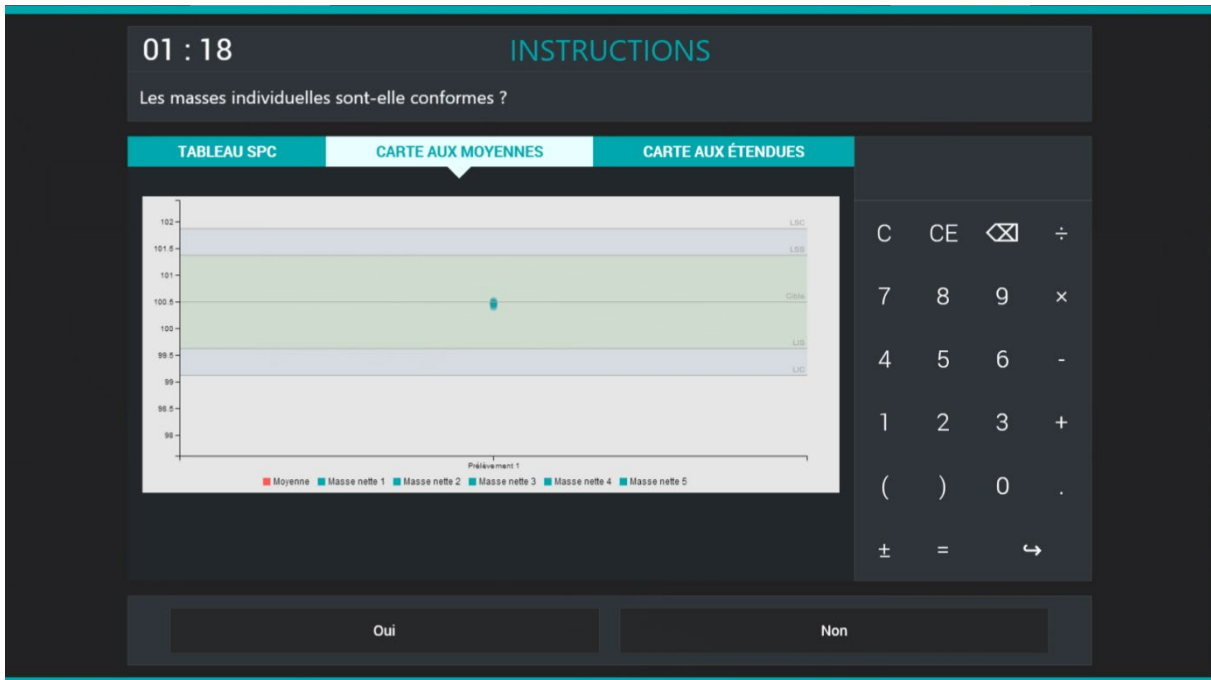
First criterion: Is the average compliant? YES



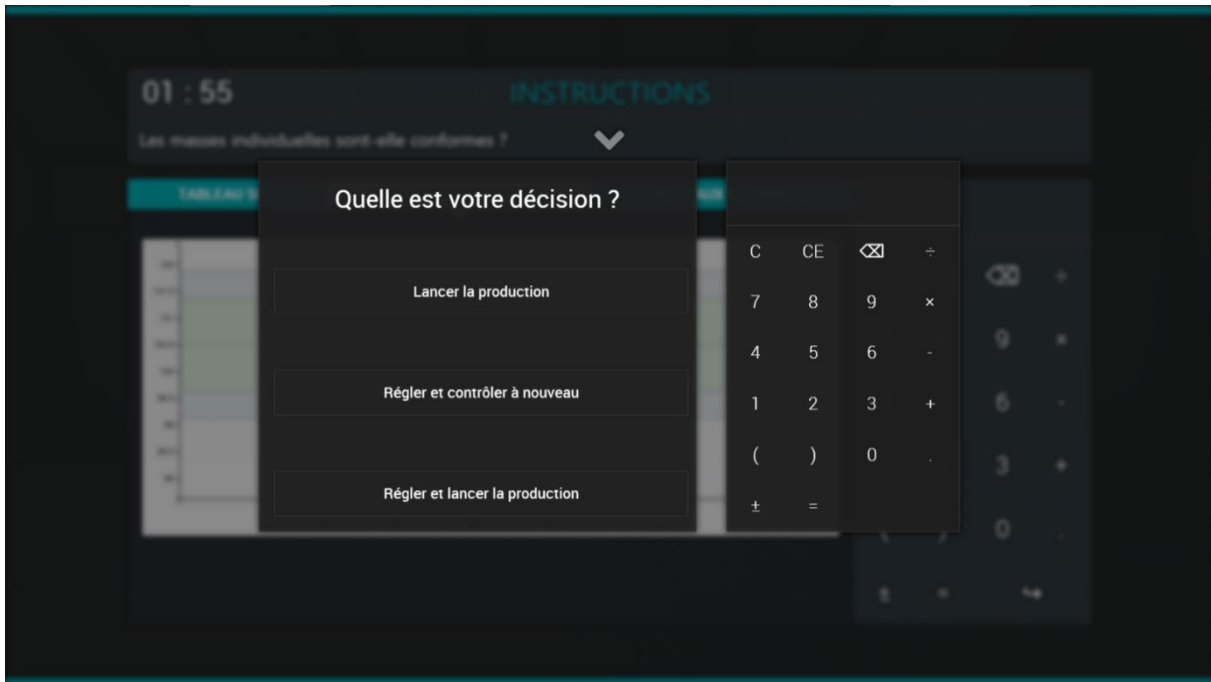
Second criterion: Is the scope compliant? YES



Third criterion: Are the individual masses compliant? YES



What is your decision? Start production

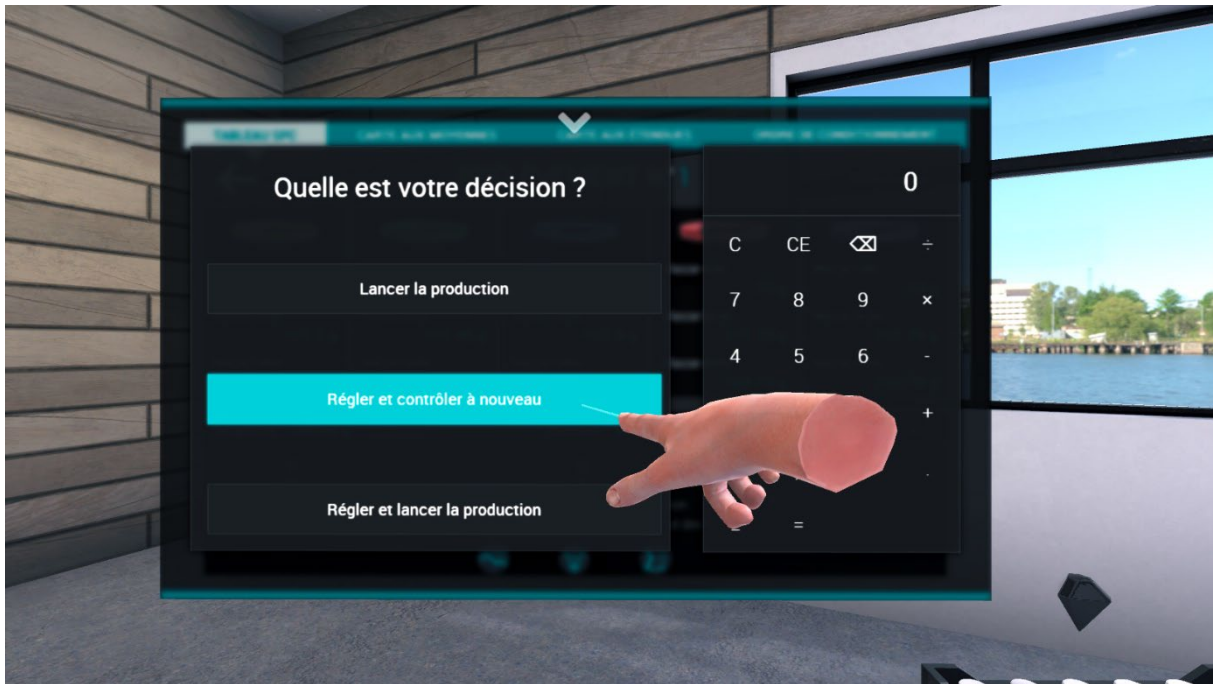


Finally, a multiple-choice question appears on the screen. The content of the MCQ and the answers are partly detailed 3.4.1.4

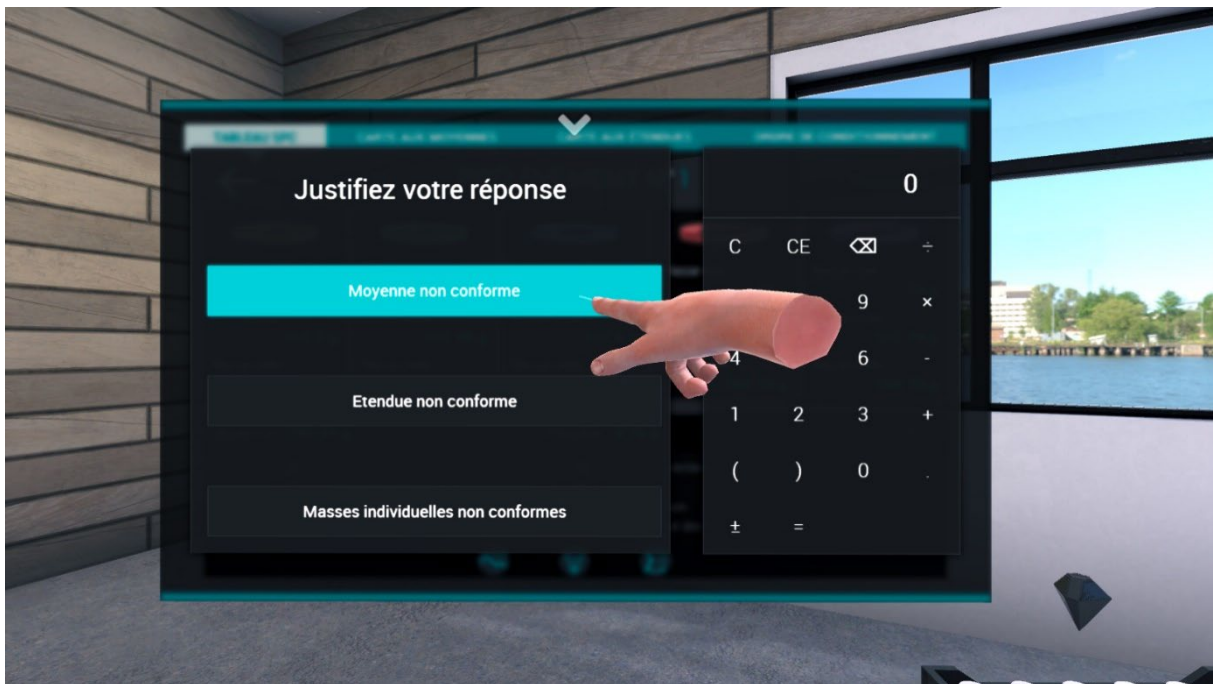
3.2.1.2 ADVANCED Level

In ADVANCE, you will be asked to answer the following question on the screen above the scale:

What is your decision? : Set & Control Again



Justify your answer: Non-compliant average



In this case, a new setting value for the dosing machine is requested:

If the sample mean is greater than the target mass:

New Setting = Old Setting – (Sample Average – Target Mass)

If the sample mean is less than the target mass:

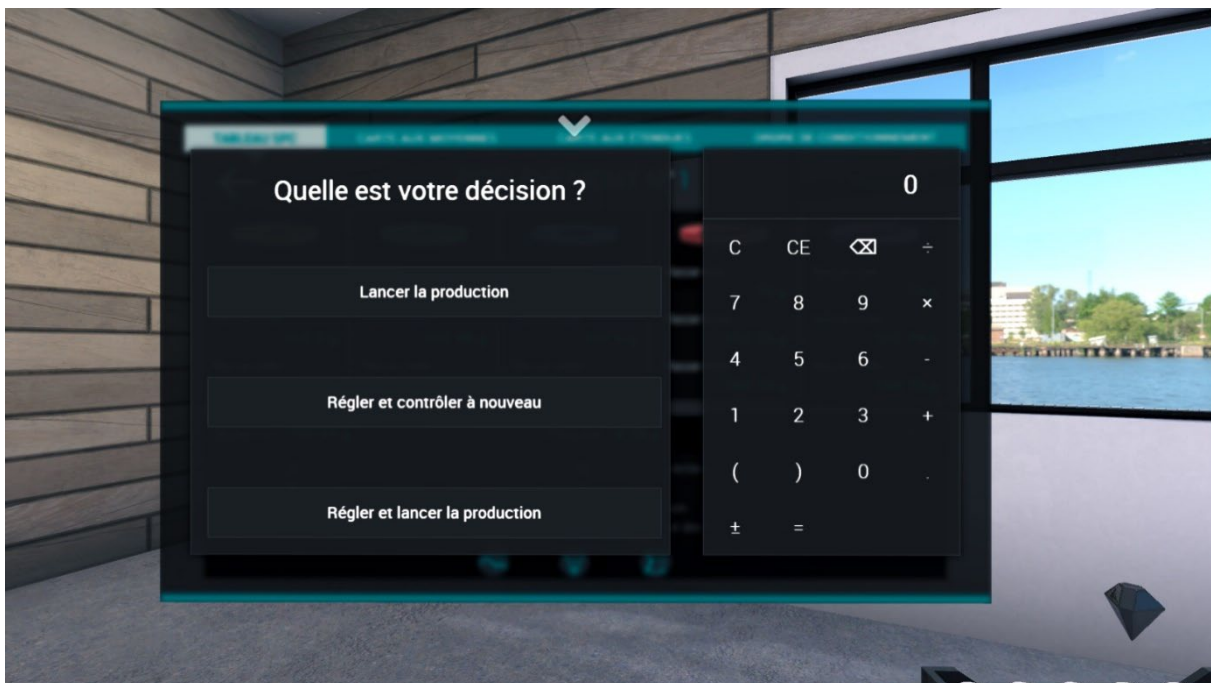
New Setting = Old Setting + (Target Mass – Sample Average)

Once the new setting has been entered and the pump has been adjusted accordingly, a sample of 5 vials must be made again, in the same way as before.

This time, the average of the 5 vials must be correct.

A question appears on the screen:

What is your decision? : Start production



It is requested to remove the headset in order to be able to answer the MCQ

3.2.1.3 EXPERT Level

At the expert level, there are no detailed steps to complete. It is necessary to calculate the new setting, adjust the pump accordingly and repeat until the mass of the control pot is correct. It is then necessary to check with 5 vials and repeat until the average of the masses of the 5 banded vials is correct, in the same way as for the ADVANCE level.

Once the qualification is completed, the learner is asked to remove their headset and a multiple-choice question is displayed on the PC screen.

3.2.1.4 QUIZZES

BEGINNER	
Question	Answer(s)
The qualification allows:	To ensure that the dosing machine will be able to perform its function under reliable conditions and in accordance with specifications
The qualification procedure shall include:	<ul style="list-style-type: none"> • A pre-setting and verification with a bottle • Fine-tuning and verification with 5 vials
Production may begin after the qualification procedure if:	The average mass of the 5 vials is between LIS and LSS (map to the averages)
Production may begin after the qualification procedure if:	The mass range of 5 vials is less than LSS (range map)
Production may begin after the qualification procedure if:	No individual mass of the 5 vials is less than LIC (map to averages)

ADVANCE - EXPERT	
Question	Answer(s)
After the pre-setting phase, there is no need to carry out a first check with a sample of 5 vials if	The value of a test vial is +/-1 g far from the set point
During the pre-setting phase, a collective tare is performed:	<ul style="list-style-type: none"> • Because the precision expected in this phase does not justify it. • To save time. • To save product
During the fine-tuning phase of the qualification procedure, an individual tare is performed:	<ul style="list-style-type: none"> • This is because the dispersion of the masses of empty vials adds imprecision to the control. • To eliminate mass-related dispersion of empty vials
During the qualification procedure, the instructions on the dosing machine are corrected to	Refocus the average mass of the doses in relation to the setpoint in view of the imprecision observed.
Without qualification before production starts, there is a risk	<ul style="list-style-type: none"> • Produce non-compliant vials from the start-up • "Overdosing" packaged products (to avoid non-conformities) • Waste time with production stoppages to adjust the dosing machine.

