



USER GUIDE

VIRTUAL INDUS Electrical Maintenance



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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

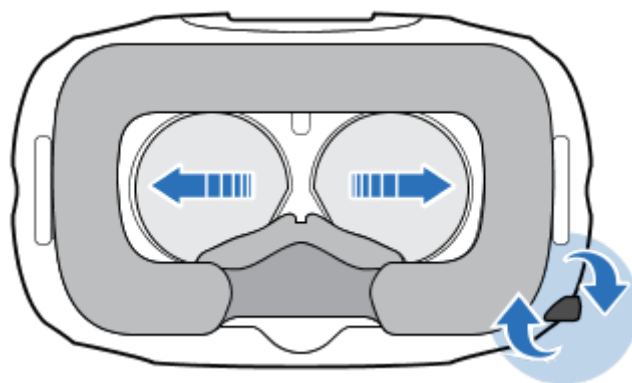
2.1 HTC Vive



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

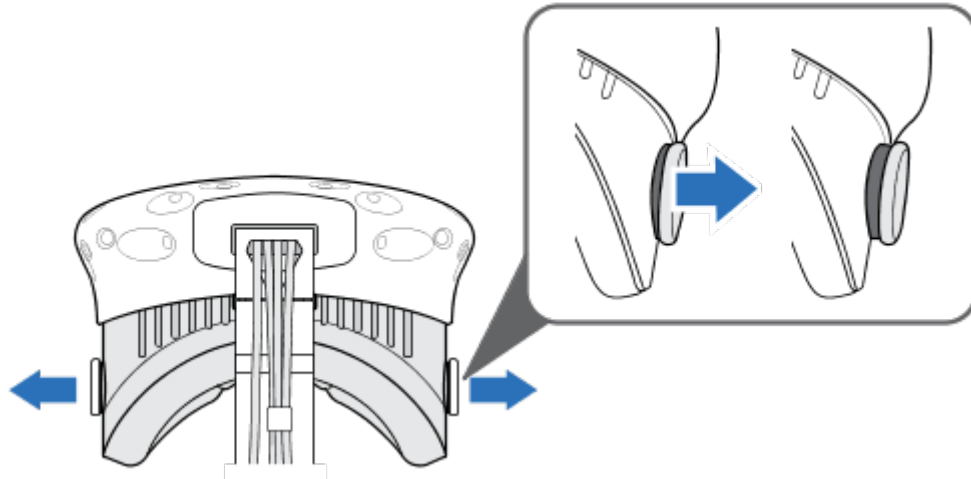
The **interpupillary distance** is the distance between the pupil center point of each eye. It can be adjusted manually with a wrench adjuster on the right side of the headset.



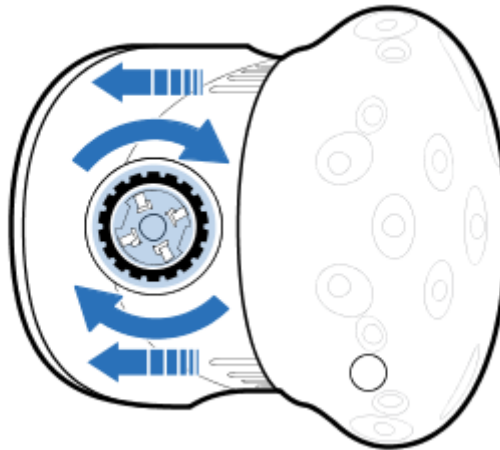
When adjusting the headset, a window pops up and displays the actual distance between the center of the glasses. It's important to adjust this interpupillary distance (IPD) to see correctly the different virtual elements in the headset.

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

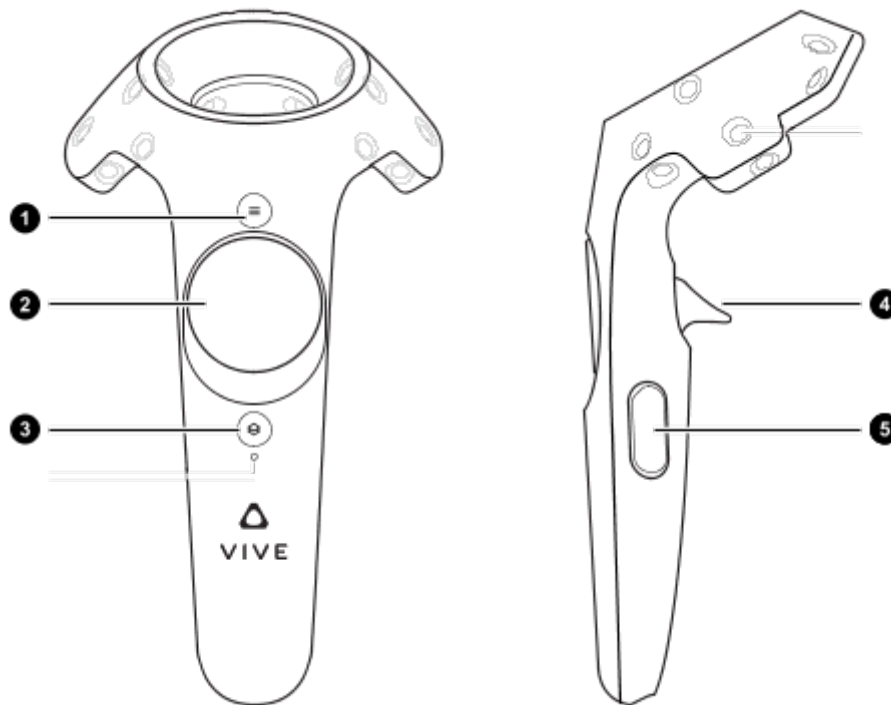
There are 2 lighthouses delivered with the **Vive**. Those are infrared lamps to estimate the headset and controllers position spatially.



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

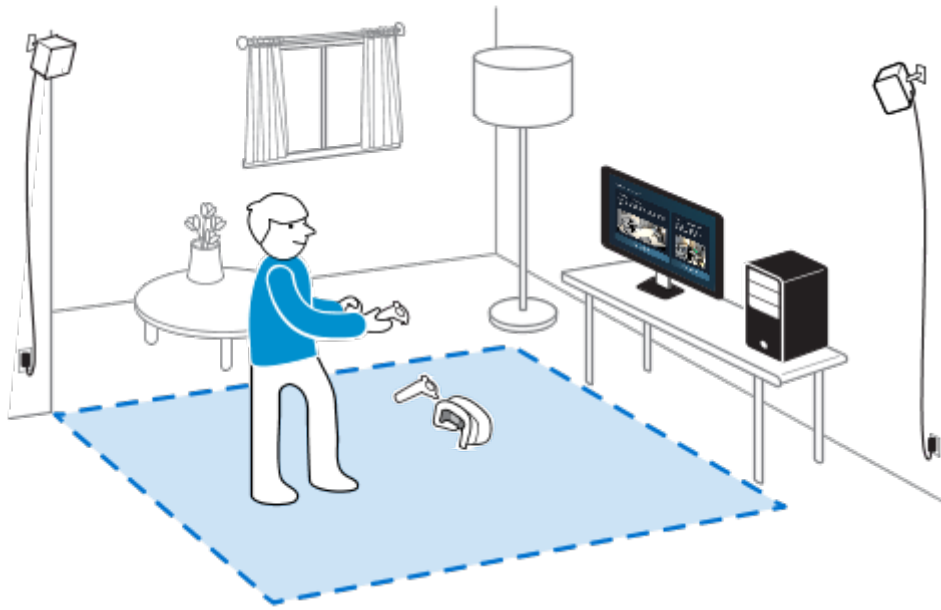
Some object can be grabbed and moved. Once those objects are on hand, you must stay pressed on the controller. The hand visual will disappear and only the object representation will remain. A blue ghost indicates where the object can be dropped.



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.

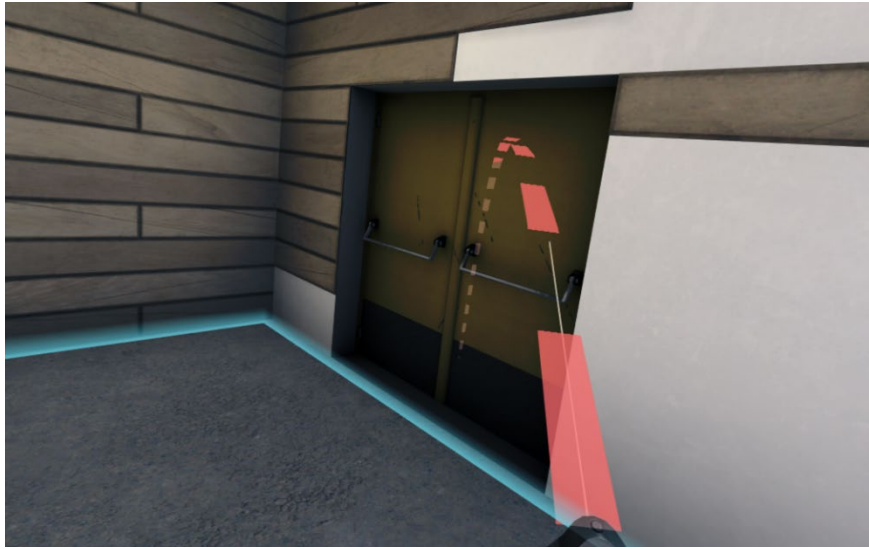


Figure 6 – Teleportation cannot be made across walls

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

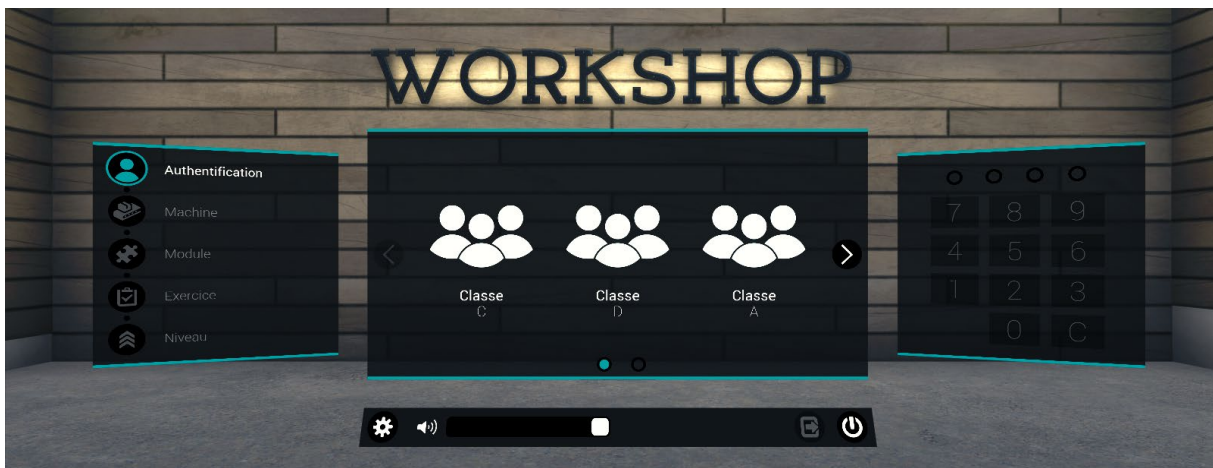


2.5.3 Authentication

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:



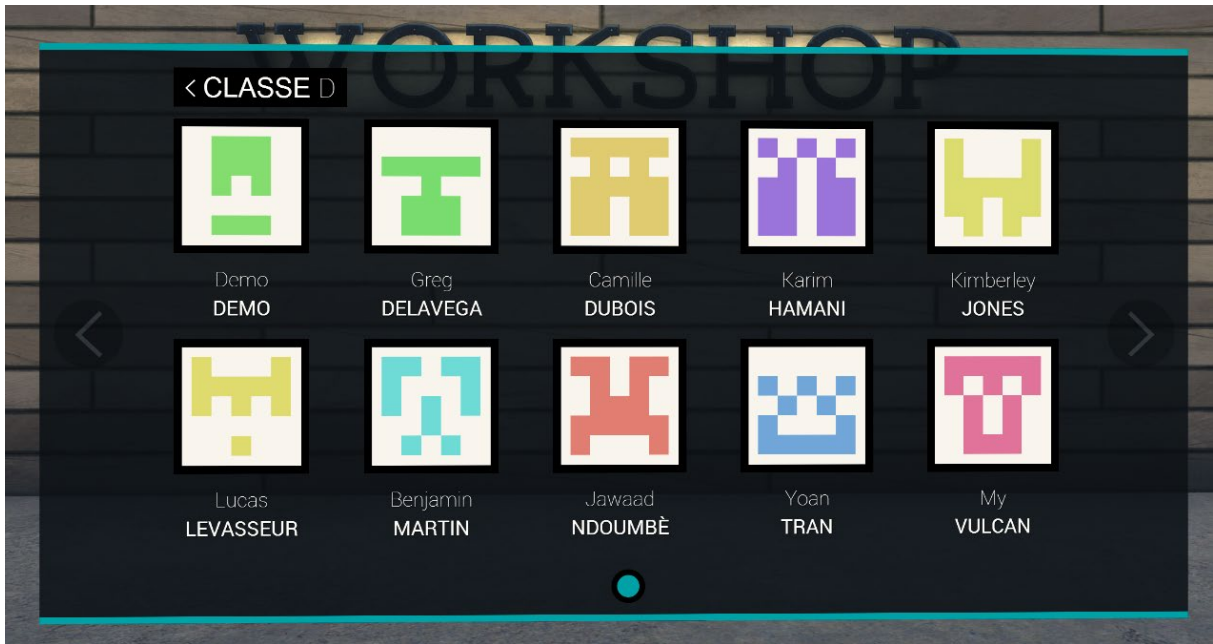
Class name appears under each class icon. This name is limited in terms of typeface and once the limit is reached, the class name will be cut and followed by "...".

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.

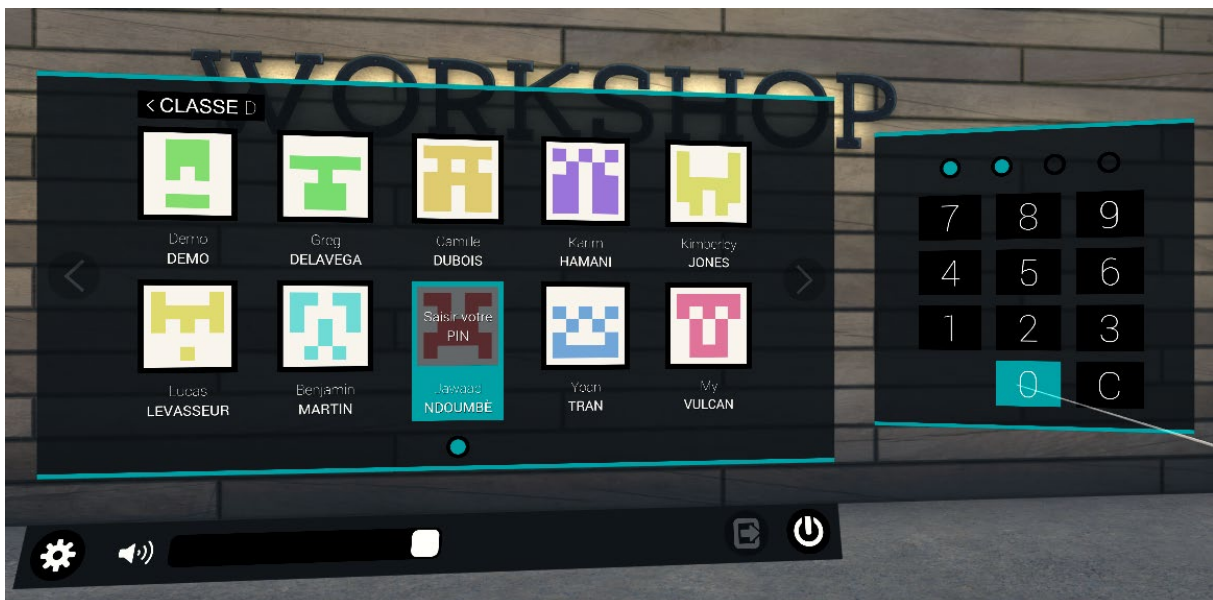
2.5.3.2 Choose the trainee

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.

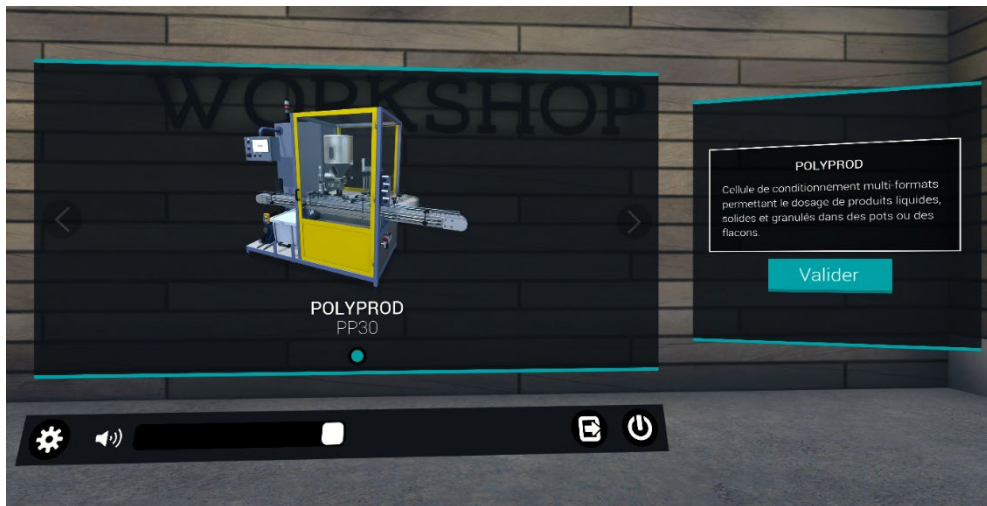
When selecting a trainee, the right keypad is activated, and you can enter the PIN code associated to finalize the authentication:



2.5.4 Selecting a Machine

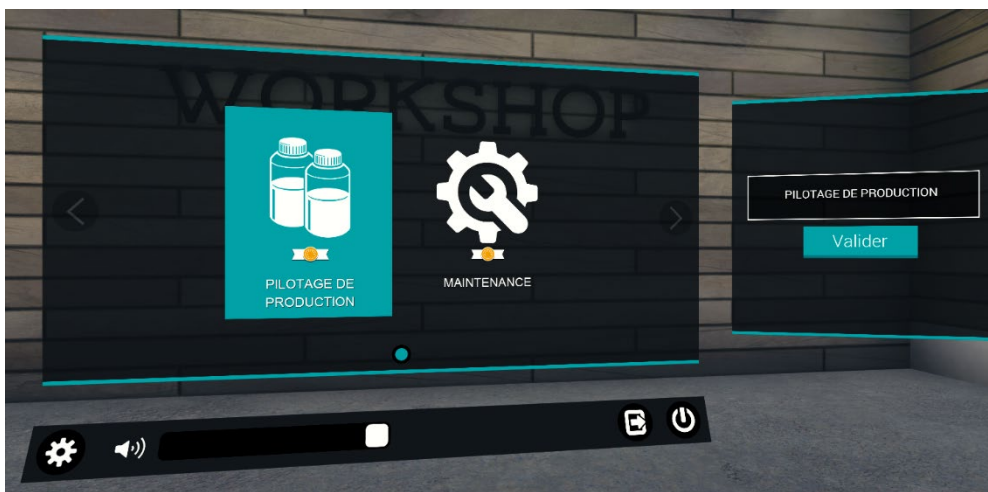
Choose the machine you want to use, works only with the **free curriculum mode**. A small description of the machine is displayed on the right side of the screen. Select the machine by pressing **Valider**.

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



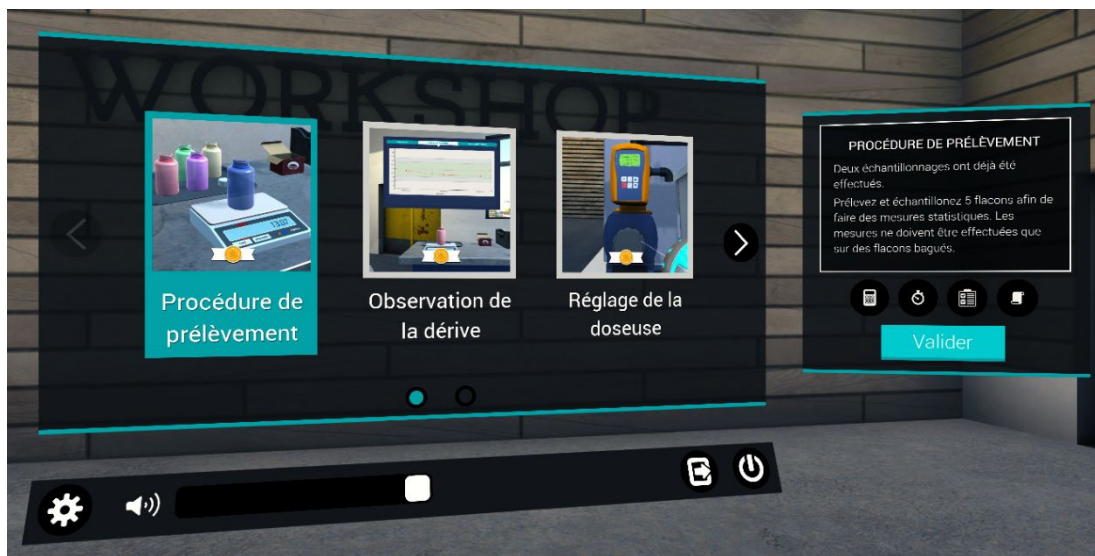
At least one level or sequence of the module has been launched or validated. In progress



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.

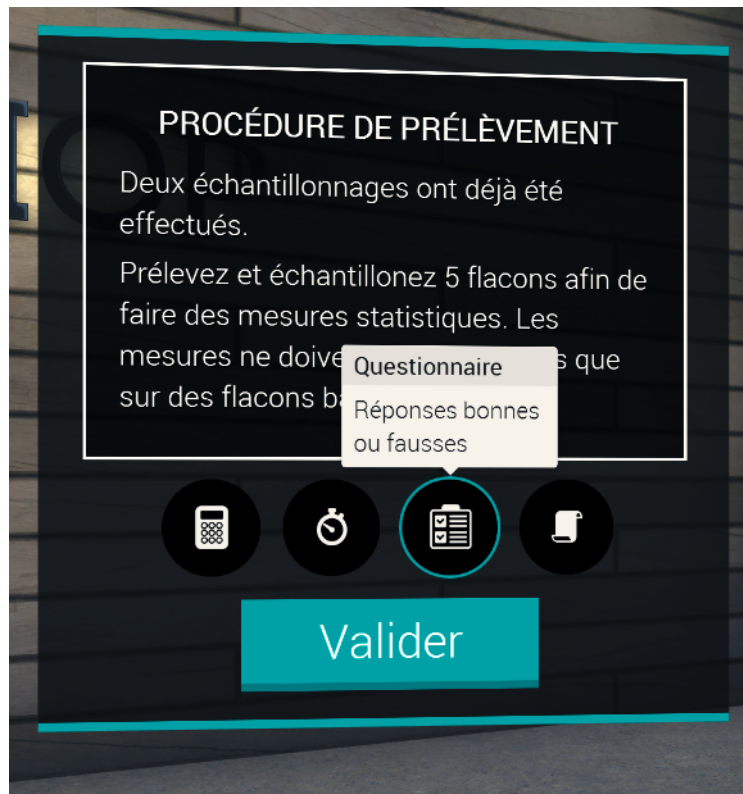
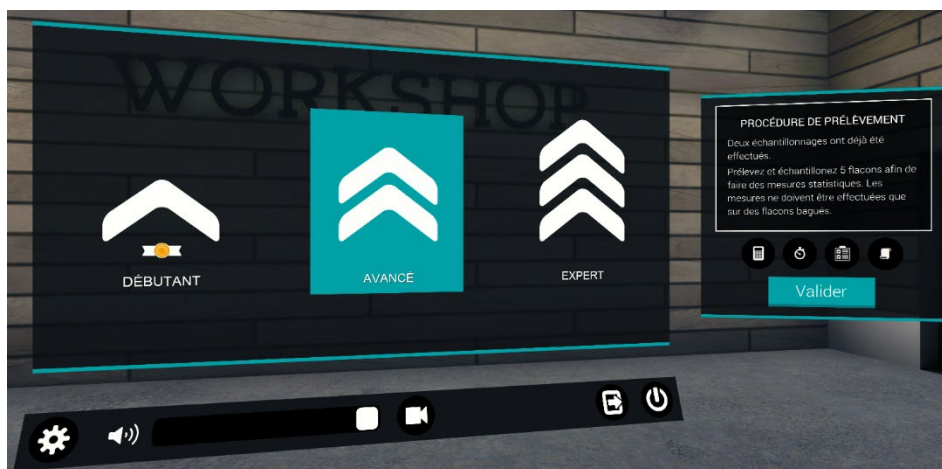


Figure 14 – Evaluation criteria of a sequence

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 Summary

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

You can use the previous step. For changing the

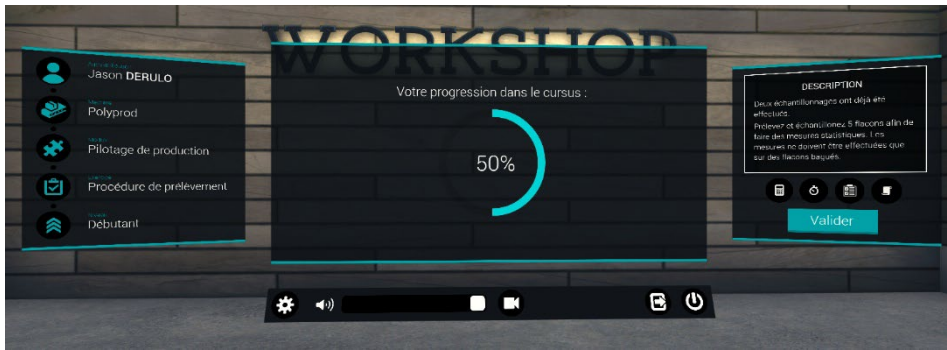
In a prescribed have the choice of the exercise level.



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

2.5.9 Imposed learning path

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



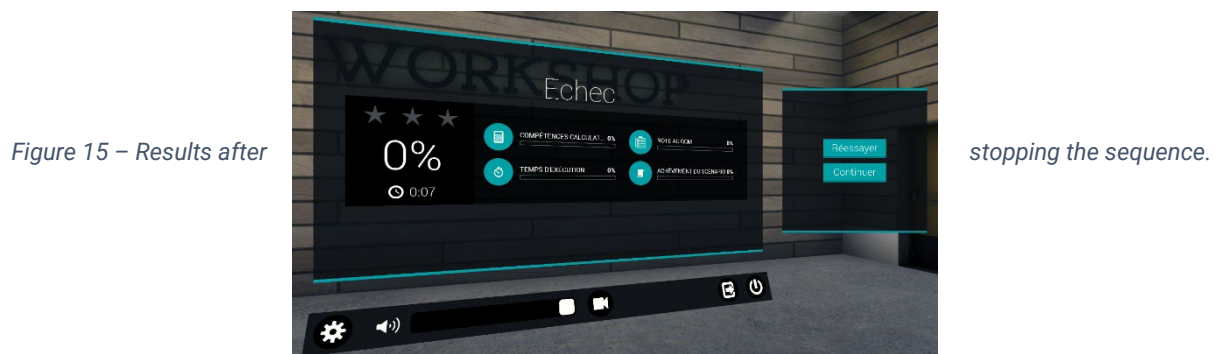
The curriculum progression is displayed by a circular gauge. The next exercise description and the evaluation criteria are displayed on the right side of the screen. The table of content sums up the machine, module, exercise and level of the exercise that need to be done. When doing imposed curriculum, 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.

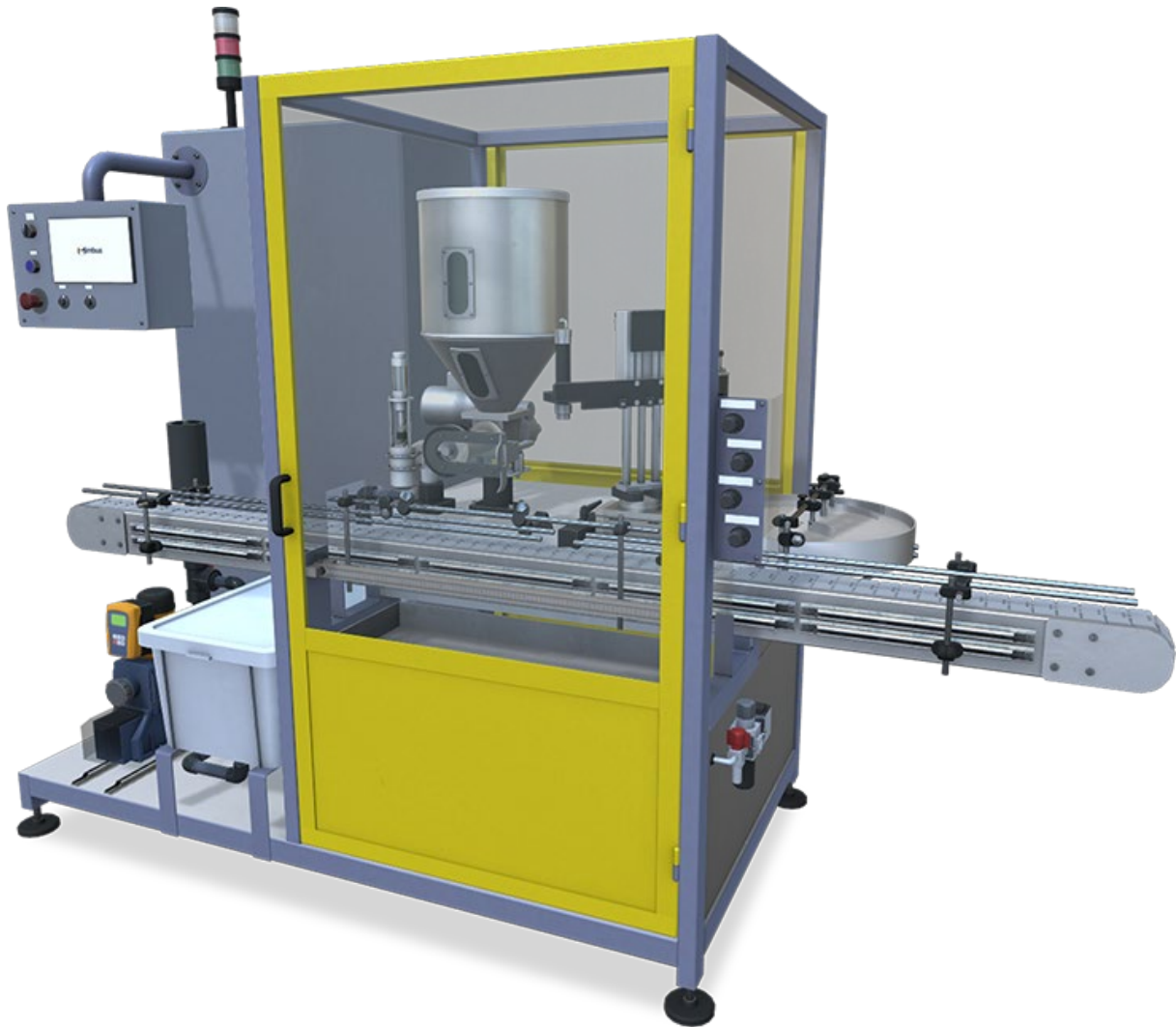
According to the success percentage, 1 to 3 stars appear filled up on the left side of the screen. The execution time is also displayed. For some sequences, the time can be an evaluation criteria.



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.



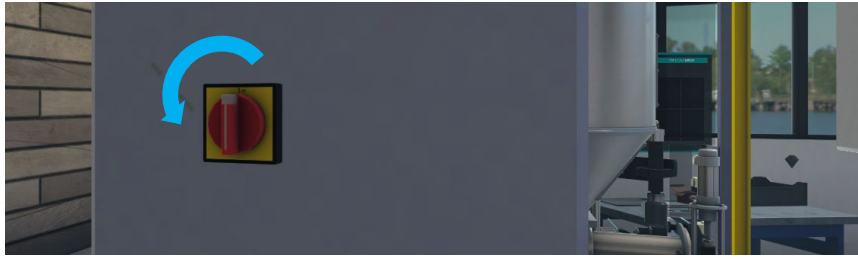


Figure 17 -Main Electric switch

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.

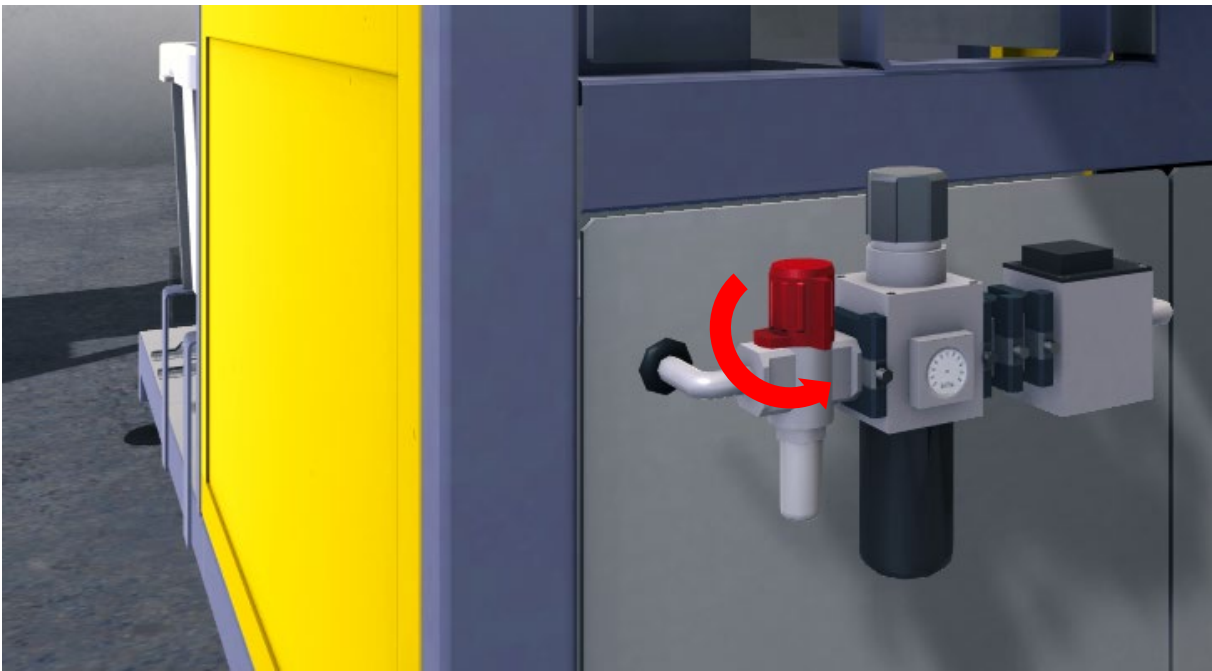


Figure 18 – Pneumatic supply switch

2.6.4 Dosing Pump

The dosing pump is located on the Polyprod frontage.

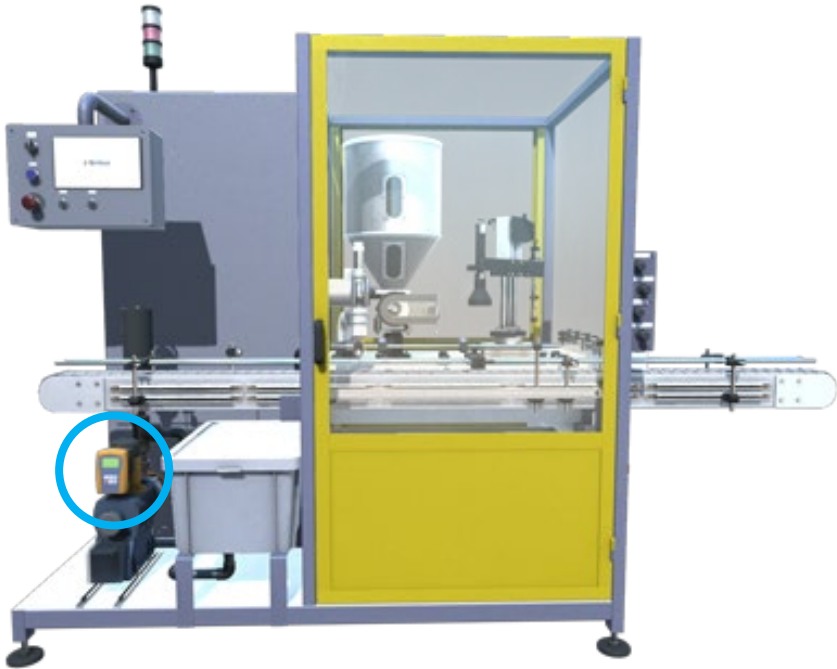






Figure 19 – Dosing pump


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

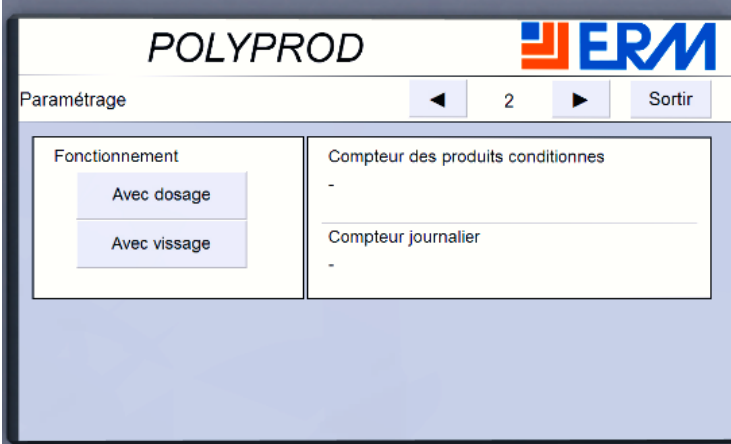
Réglage à faire sur la pompe : 80 %


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.

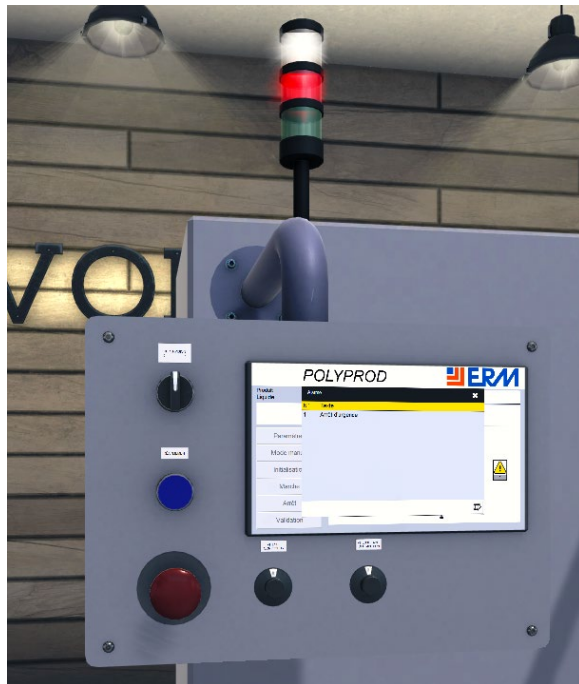


Figure 22 – emergency stop pressed

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

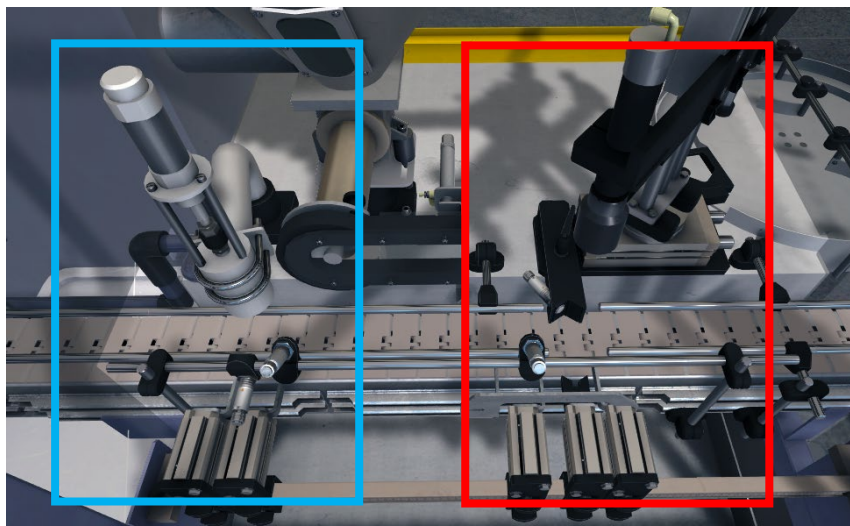


Figure 24 – **Dosing** and **Screwing** of corks

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

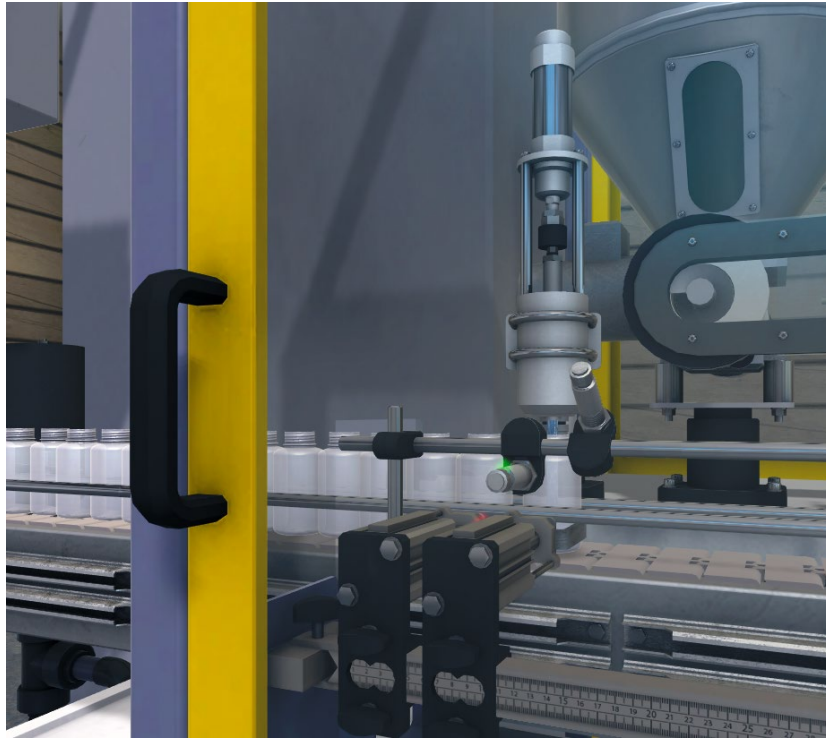


Figure 25 – Dosing a flask

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

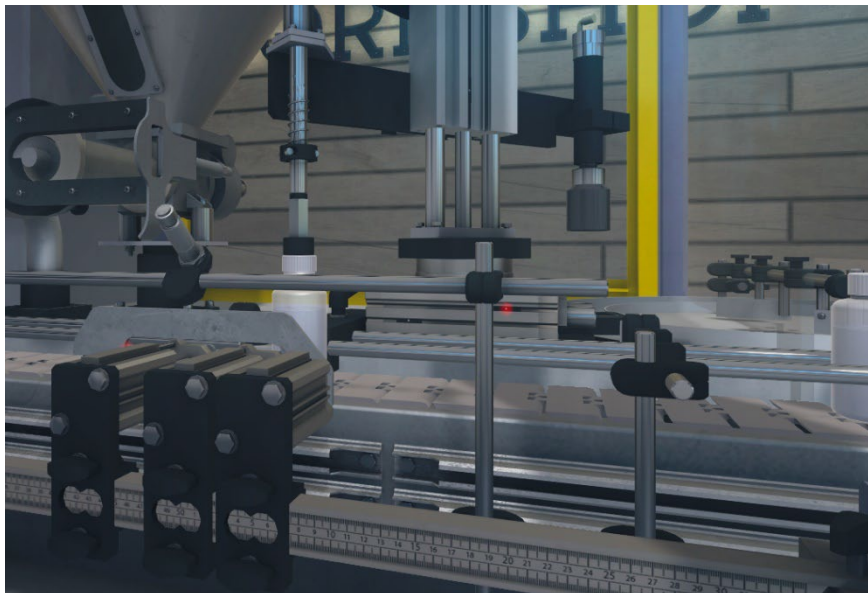


Figure 26 – Screwing a flask cork



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

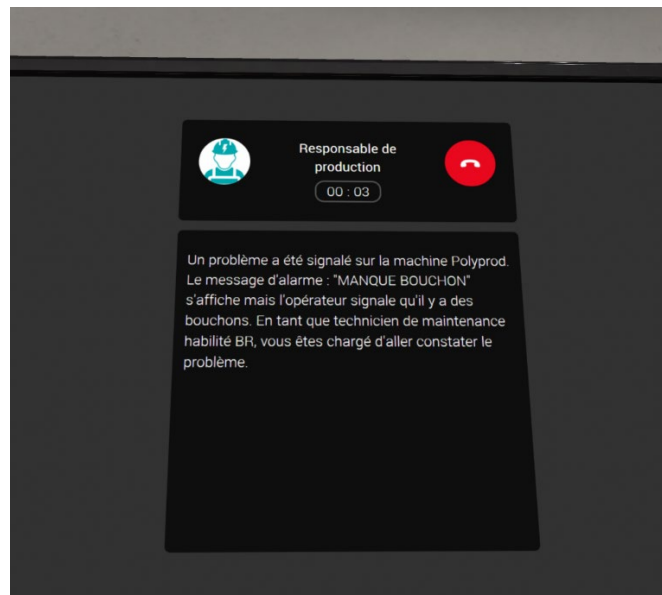
In this part, we will detail how to perform each step of each sequence.

3.1 Module 2: Maintenance

3.1.1 Sequence 1: Completion of a failure report (Failure 1 - Q6)

The purpose of this sequence is to prepare for an electrical maintenance intervention that will take place on the Polyprod machine by filling out a fault report.

The sequence begins in the locker room next to the workshop with a call from the production manager on the briefing screen.



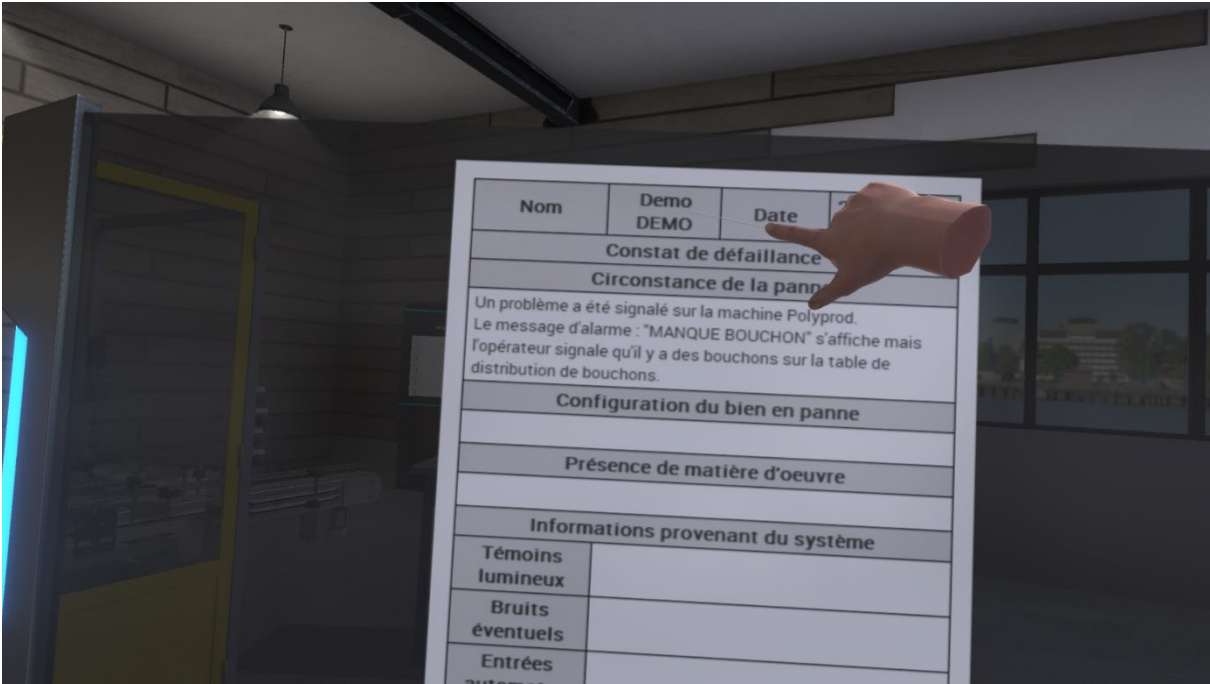
First of all, you are asked to read the defect report displayed on the screen in the workshop and to identify yourself. To do this, you have to leave the locker room through the door separating them from the workshop and reach the screen.



The report of failure screen can be grasped and moved as needed, by gripping it at the wafer with a long press of the trigger.



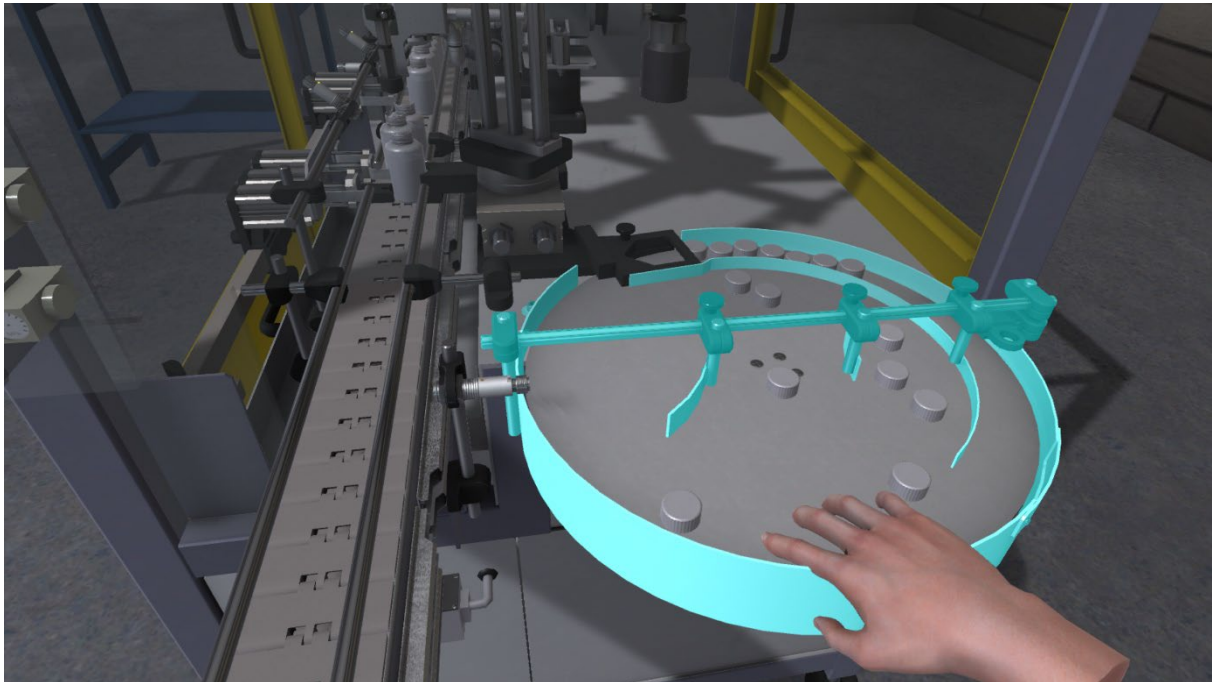
Identification is done by clicking on the "name" box at the top of the screen.



It is then asked to reset and start initializing the machine. Pressing the "reset" and "initialize" buttons on the Polyprod control panel is enough to validate this step. You will then have to wait about twenty seconds, the time it takes for the machine to initialize before moving on to the next step, which will consist of turning it on by pressing the "on" button.



The condition of the system and the presence of a plug should be checked. Tap the cap dispensing table and click the trigger on the controller.



The next steps will take place on the report of default screen.

It is requested to complete the statement of failure by choosing the correct answer from several proposed. Correct answers will be in bold:

Indicate the failed function:

- The main conveyor belt is not working
- Dosing doesn't work
- **The cap dispensing table does not rotate**

Indicate if there are any plugs on the turntable:

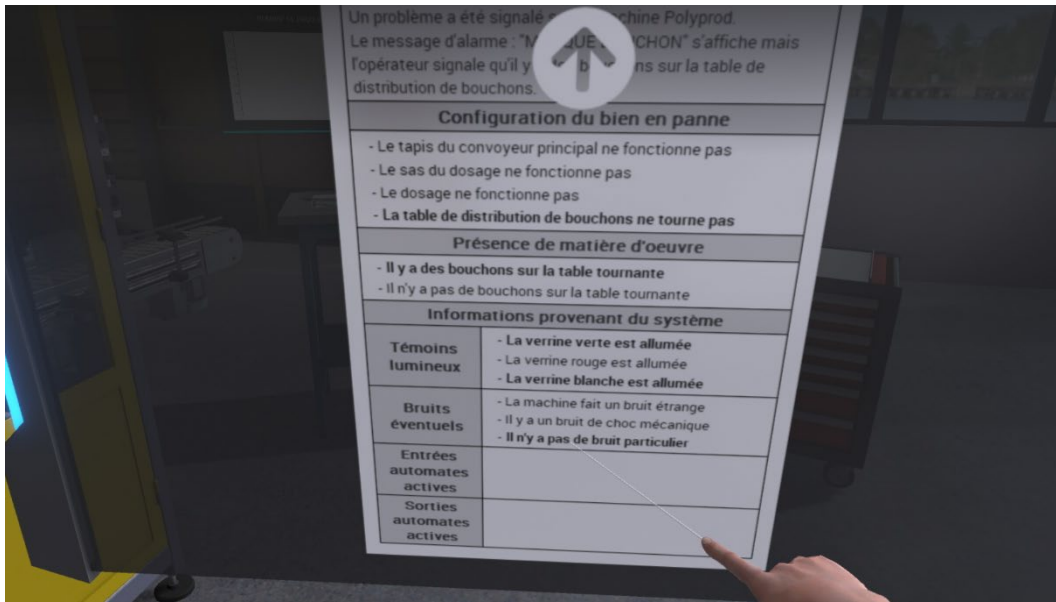
- **Yes**
- No

Indicate the status of the LEDs:

- **The green verina is on**
- The red verina is on
- **The white verina is on**

Indicate if the machine makes any noise other than that of the conveyor belt:

- The machine makes a strange noise
- There is a mechanical shock noise
- **There is no particular noise**



Go to the active I/O desk and check out the different pages:

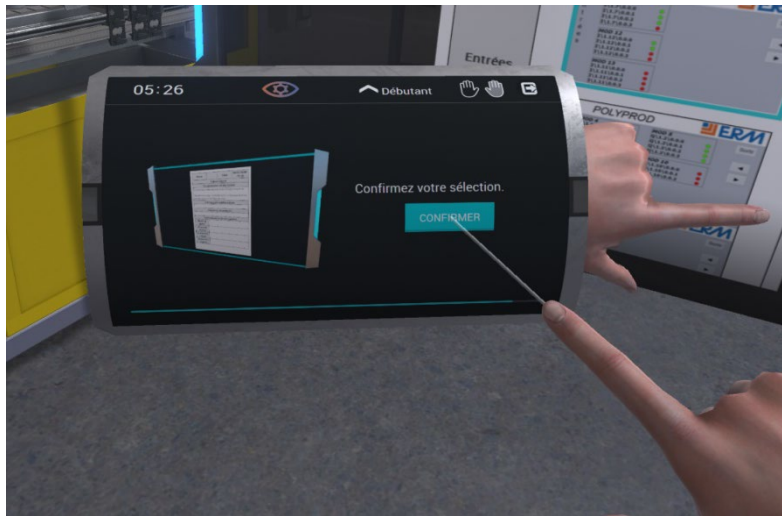
You have to click on the "view" button at the bottom right on the main screen of the Polyprod console. It is possible to browse the different pages by clicking on the left and right arrows on the screen. The step is validated when the last page of inputs/outputs is opened.



Pressing the "acquire" button on the tablet on your wrist validates the next step. This will have the effect of displaying the entry and exit screens on the failure report. It will then be necessary to identify the input screen and the output screen. They can be differentiated by the text "inputs" or "outputs" displayed on the left side of each screen.



Finally, you are asked to confirm the selection. It is possible to modify or complete the different choices of the declaration of failure.



Once the report of failure has been completed and the "Confirm" button on the wrist has been clicked, the report of failure is then generated in PDF format. This can be found in the records folder, a shortcut of which can be found on the desktop.

In the PDF of the report of failure, the selected responses are in bold. While correct answers are underlined. If a choice is correct it will be displayed in green, otherwise it will be displayed in red, along with the correct answer.

3.1.2 Sequence 2: Electrical maintenance intervention (Failure 1 - Q6)

Sequence 2 consists of carrying out a maintenance operation on the Polyprod machine. The purpose is to identify the faulty component in the control cabinet.

The sequence begins with a multiple-choice question displayed on the PC screen:

Beginner	
Questions	Answers
What is the faulty function?	Dispensing the caps
Choose components that are likely to be defective:	<ul style="list-style-type: none"> • Q6 • KM2 • M2
What is the voltage value of the control part?	24VDC
What is the voltage value of the power part?	400VAC
What is the value of the voltage that should be measured across Q6, KM2, X1?	400VAC
What is the value of the voltage that needs to be measured across the coil of the KM2 contactor?	24VDC
Identify the risks associated with the maintenance activity:	Electrical Hazards

What preventive measures are appropriate for the dangerous situations identified?	<ul style="list-style-type: none">• E.P.I• E.I.S• E.P.C
---	---

Following the MCQ, the headset is asked to be replaced.

It is now necessary to place the equipment and tools necessary for the intervention in the toolbox.

The following are mandatory for the intervention:

- The helmet
- Insulating gloves (yellow gloves)
- The Glove Tester
- The Temporary Markup Banner
- Construction Warning Sign
- Marker posts
- The insulating mat
- The Voltmeter



Once the tools have been placed in the tool box, you are asked to leave the locker room. All you have to do is walk through the door to validate the step. A warning will sound if the tools and equipment chosen are incorrect.

The markup now needs to be put in place. Place the posts, the red and white ribbon on the poles and then the sign on the same tape. The insulating mat can then be placed on the floor in front of the Polyprod electrical cabinet.



To be able to open the door of the control cabinet, you must first test the gloves. The glove tester must be gripped and released onto each glove, previously grasped in its other hand.



As the gloves have been tested, all you have to do is equip them by letting them go on the appropriate hand, as well as equip the helmet and lower the visor.

It is then possible to open the door of the control cabinet.



The learner is asked to grasp the voltmeter and set it to 750V AC.



The voltmeter must be grasped with one hand, and with the other it is possible to adjust the gauge via the rotary knob on the front of the tool. Then grasp the secondary tip attached to the bottom of the voltmeter with your free hand while holding down the trigger.



Voltmeter tips can be attached to terminals of electrical components by bringing the tip close to a terminal and holding down the controller trigger.

Several measurements must be made with the voltmeter:

Upstream voltage of Q6 between terminals 106 and 118, 118 and 123, 106 and 123.



Once the voltage measurement has been carried out upstream of Q6, it is requested to operate the circuit breaker Q6 to check that it is properly engaged.

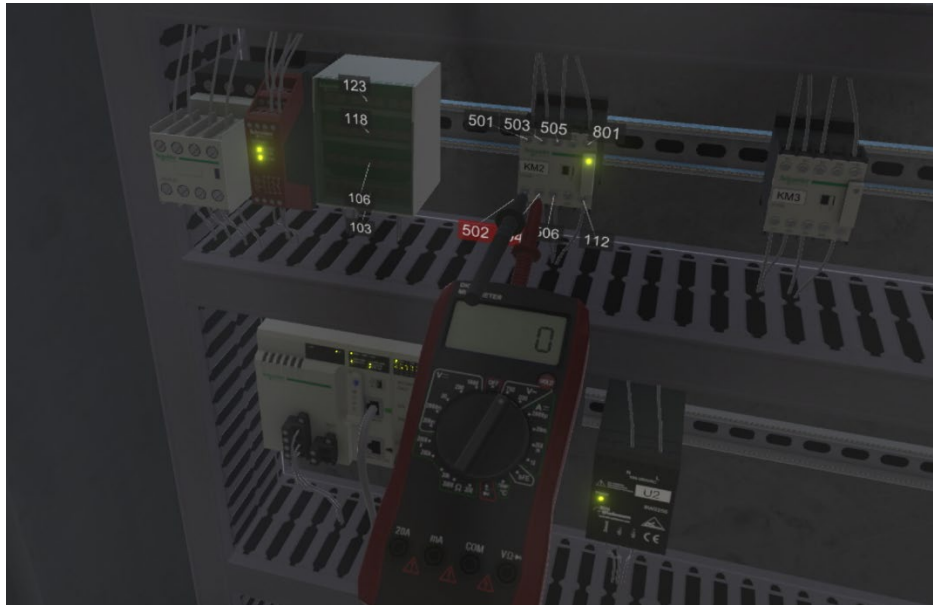


You have to point and click on the red OFF button and then on the black ON button to its right.

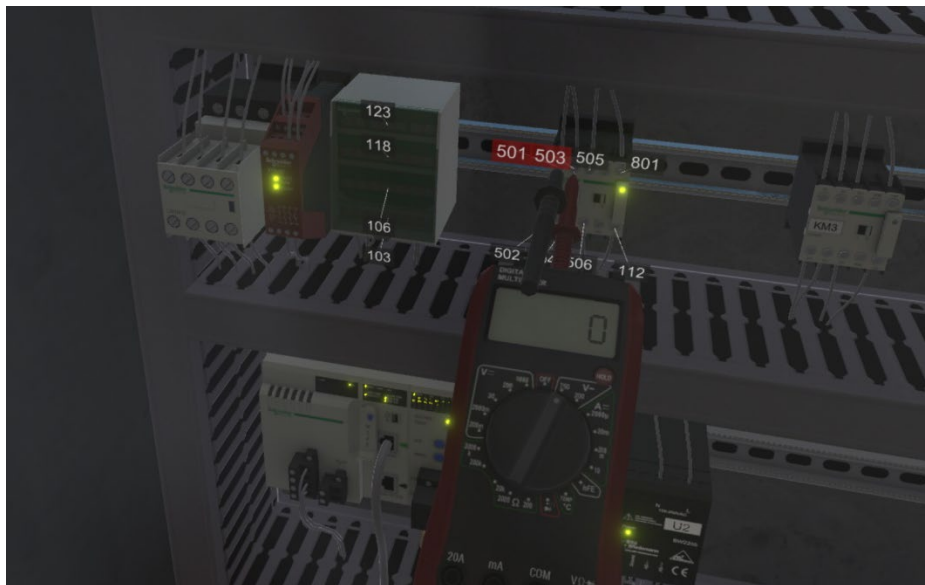
Voltage measurement at the X1 motor terminal block at terminals 502 and 504, 504 and 506, 502 and 506.



Downstream voltage of KM2 between terminals 502 and 504, 502 and 506, 504 and 506.



Upstream voltage of KM2 between terminals 501 and 503, 501 and 505, 503 and 505.

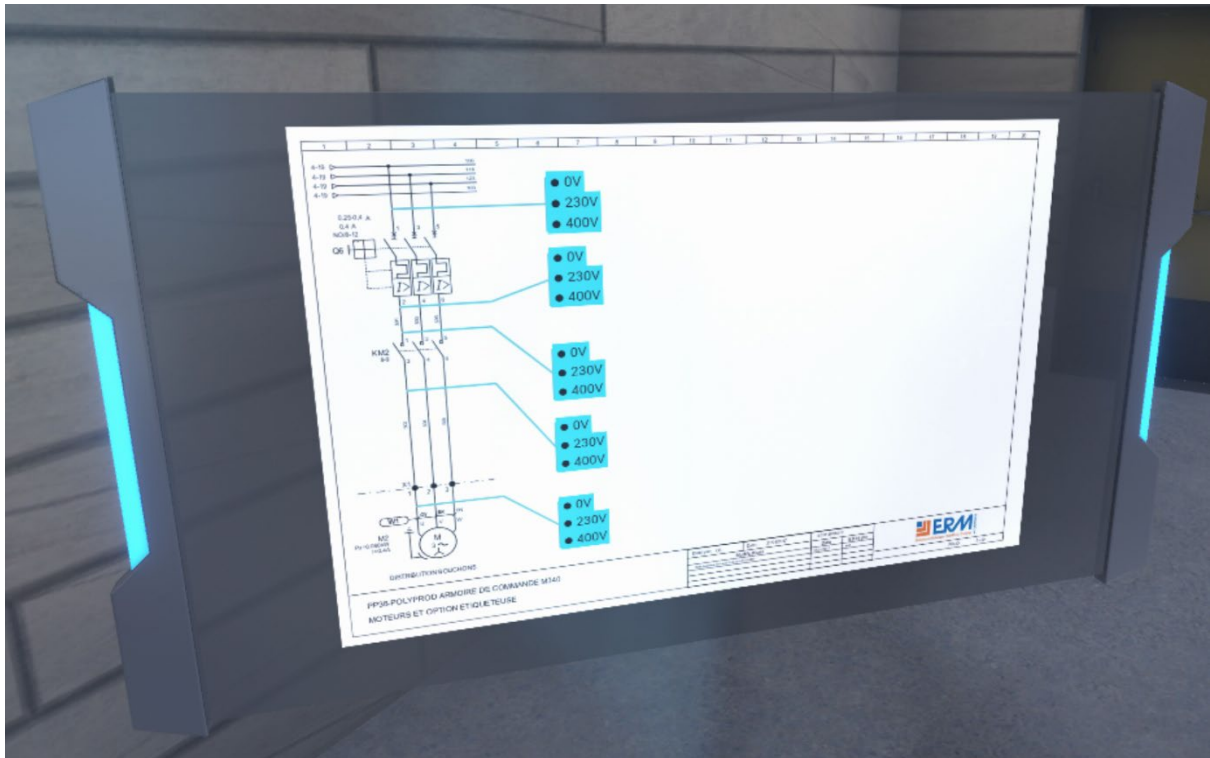


Downstream voltage of Q6 between terminals 501 and 503, 501 and 505, 503 and 505.



To be able to store the voltmeter in the tool box, the secondary tip on the bottom of the voltmeter must be reattached to the blue area.

The measurement chart is now displayed on the floating screen on the shop floor.



It is possible to enter on this screen the measurements made previously at the places indicated on the electrical diagram.

Ahead of Q6:

- **400V**

Downstream of Q6:

- **0V**

Upstream of KM2:

- **0V**

Downstream of KM2:

- **0V**

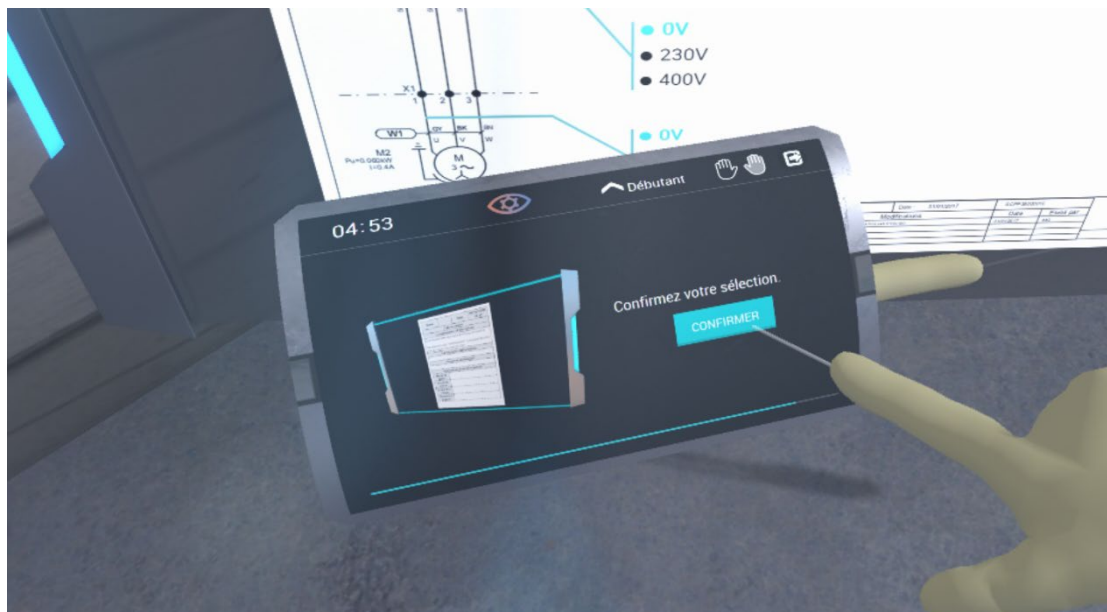
At X1 terminals:

- **0V**

The selected values appear in bold.



Once all the proposals have been made, a "confirm" button appears on the tablet on the wrist and allows you to validate the current answers.



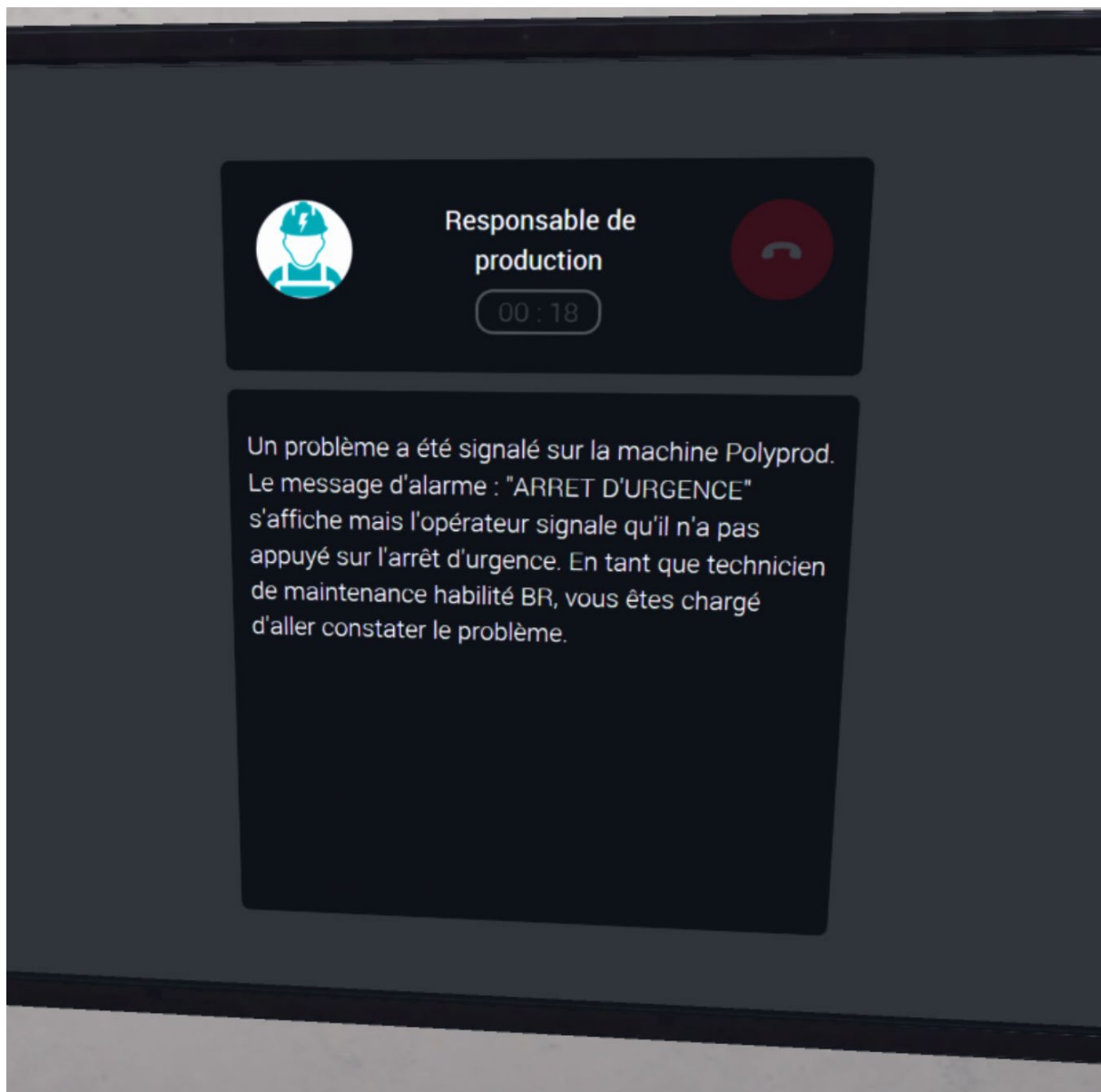
It is requested to point out the faulty component. This is the Q6 component. Point in the direction of Q6 and click the trigger to end the exercise.



3.1.3 Sequence 3: Completion of a failure report (Failure 2- S3)

The purpose of this sequence is to prepare for an electrical maintenance intervention that will take place on the Polyprod machine by filling out a fault report.

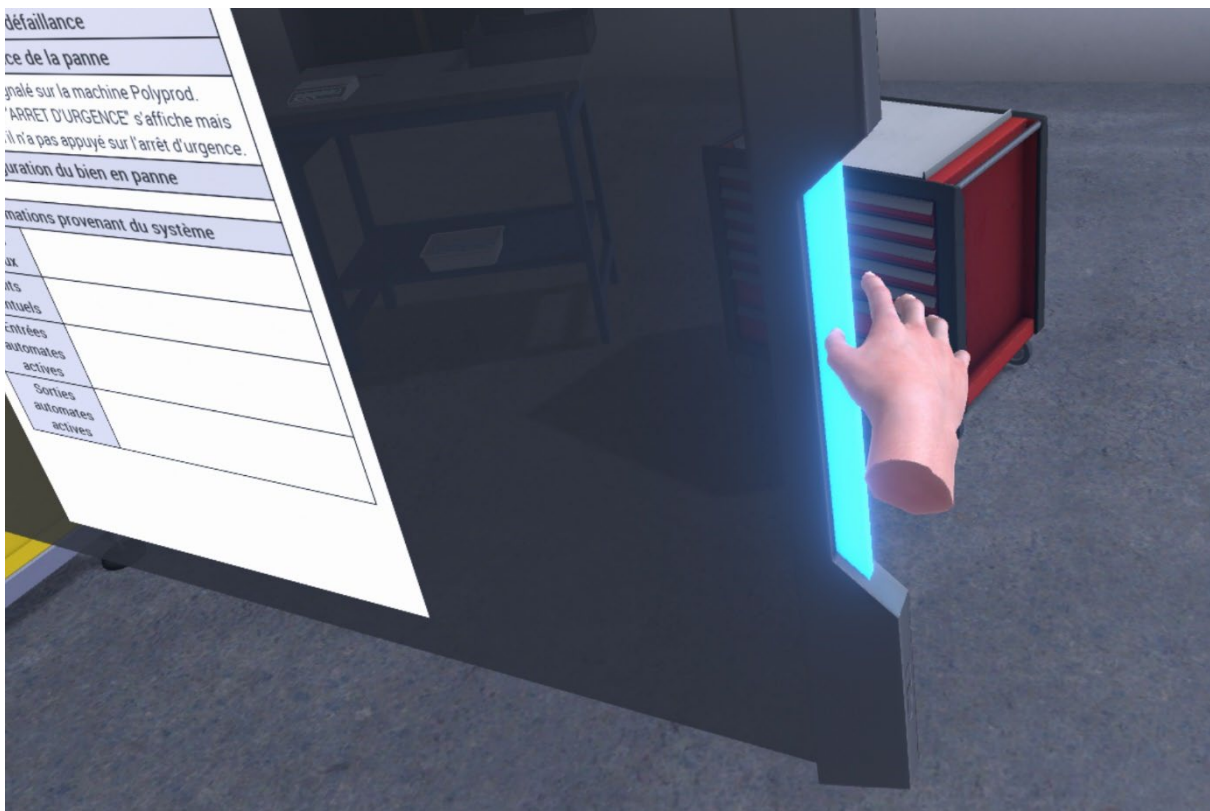
The sequence begins in the locker room next to the workshop with a call from the production manager on the briefing screen.



First of all, you are asked to read the defect report displayed on the screen in the workshop and to identify yourself. To do this, you have to leave the locker room through the door separating them from the workshop and reach the screen.



The report of failure screen can be grasped and moved as needed, by gripping it at the wafer with a long press of the trigger.



Identification is done by clicking on the "name" box at the top of the screen.

Nom		Date	20/11/04
Constat de défaillance			
Circonstance de la panne			
Un problème a été signalé sur la machine Polyprod. Le message d'alarme : "ARRET D'URGENCE" s'affiche mais l'opérateur signale qu'il n'a pas appuyé sur l'arrêt d'urgence.			
Configuration du bien en panne			
Informations provenant du système			
Témoins lumineux			
Bruits éventuels			
Entrées automates actives			
Sorties automates actives			

Once the user has been identified, it is requested to check if the emergency stop button is engaged. The step is validated by pressing the emergency stop button on the Polyprod console with one click and then pulling it with a second click.



As the point button is not engaged, it is now necessary to check that neither of the two yellow doors of the Polyprod is open. To validate this step, open and close the two doors that could trigger an emergency stop.



It is then asked to reset and start initializing the machine. The step is validated by pressing the blue reset button on the Polyprod console. Because the machine is in an emergency shutdown, the initialization option remains grayed out.



The next steps will take place on the report of default screen.

It is requested to complete the statement of failure by choosing the correct answer from several proposed. Correct answers will be in bold:

Indicate the failed function:

- The main conveyor belt is not working
- Dosing doesn't work
- **Nothing works, the machine is in emergency shutdown**

Indicate the error message(s) displayed on the touch panel:

- **Emergency stop**
- Missing cork
- Missing Container
- Tamping at machine outlet

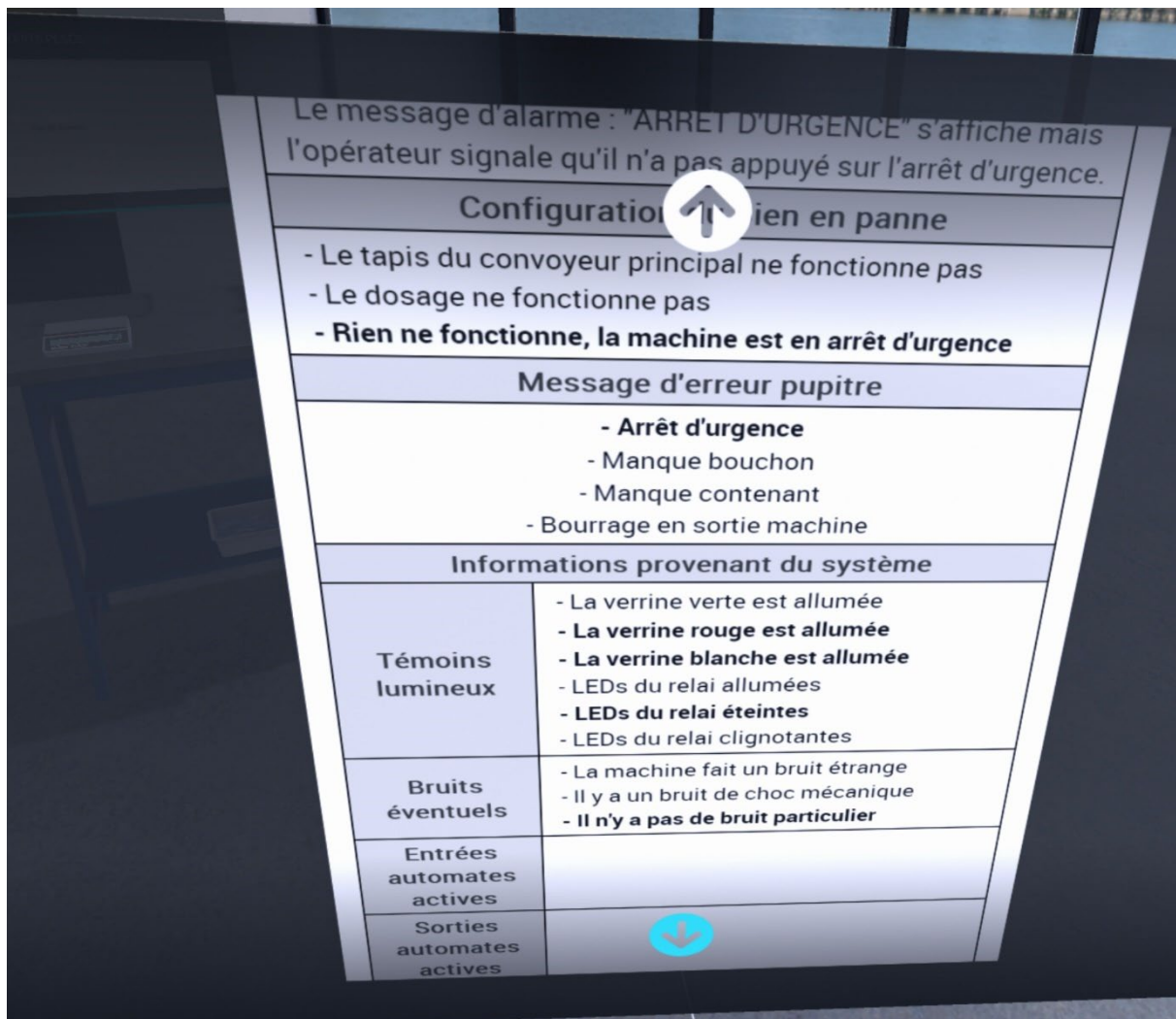
Indicate the status of the LEDs and LEDs on the safety relay:

- The green verina is on

- **The red verina is on**
- **The white verina is on**
- Relay LEDs on
- **Relay LEDs off**
- Flashing relay LEDs

Indicate if the machine makes any noise other than that of the conveyor belt:

- The machine makes a strange noise
- There is a mechanical shock noise
- **There is no particular noise**



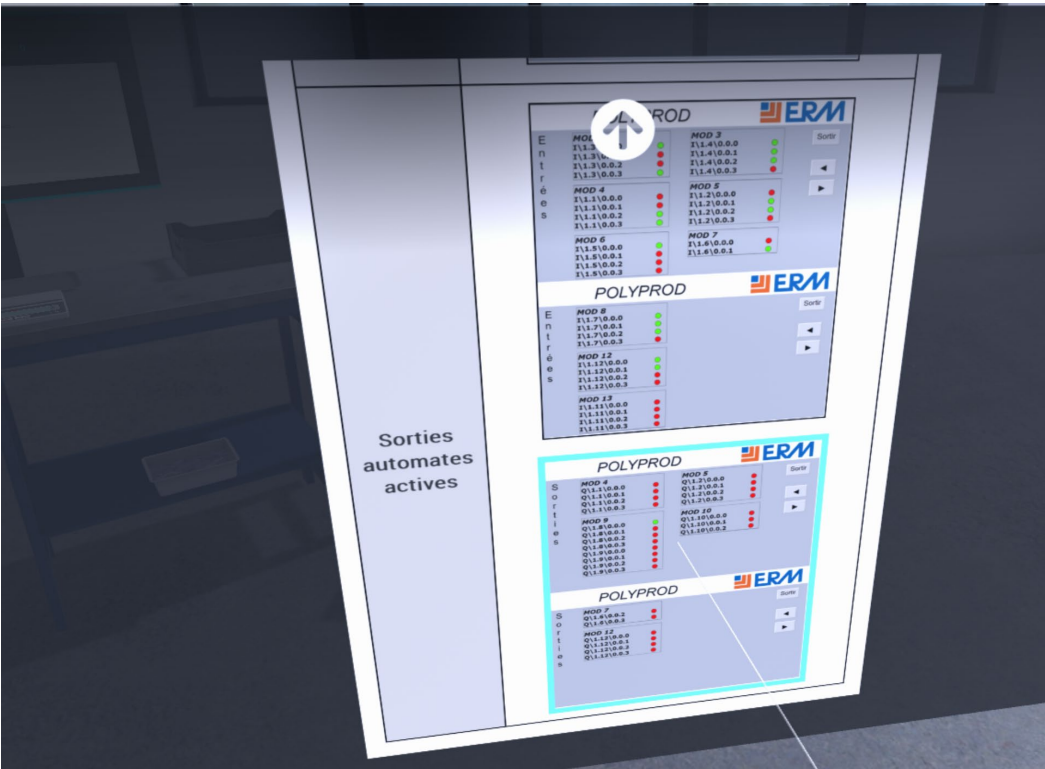
Go to the active I/O desk and check out the different pages:

You have to click on the "view" button at the bottom right on the main screen of the Polyprod console. It is possible to browse the different pages by clicking on the left and right arrows on the screen. The step is validated when the last page of inputs/outputs is opened.

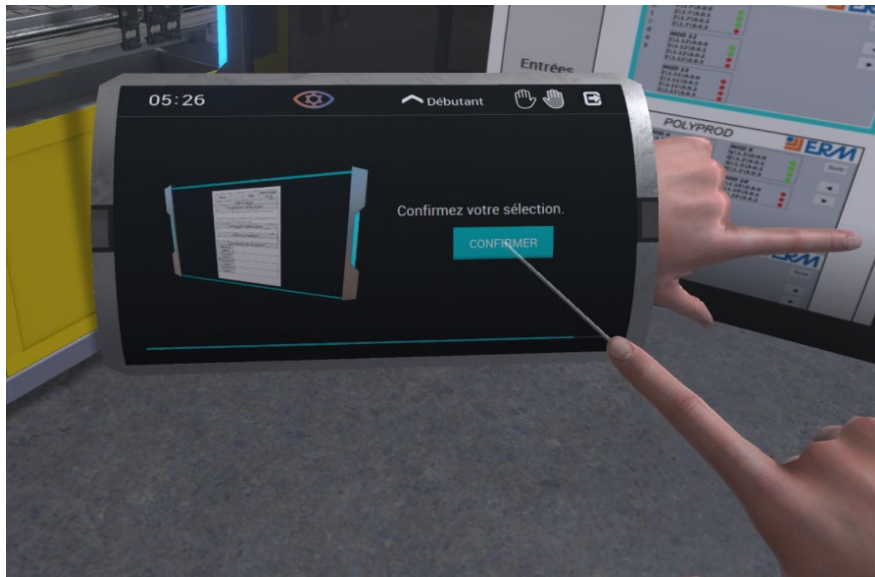


Pressing the "acquire" button on the tablet on your wrist validates the next step. This will have the effect of displaying the entry and exit screens on the failure report. It will then be necessary to identify the input screen and the output screen. They can be differentiated by the text "inputs" or "outputs" displayed on the left side of each screen.





Finally, you are asked to confirm the selection. It is possible to modify or complete the different choices of the declaration of failure.



Once the report of failure has been completed and the "Confirm" button on the wrist has been clicked, the report of failure is generated in PDF format. This can be found in the records folder, a shortcut of which can be found on the desktop.

In the PDF of the report of failure, the selected responses are in bold. While correct answers are underlined. If a choice is correct it will be displayed in green, otherwise it will be displayed in red, along with the correct answer.

3.1.4 Sequence 4: Electrical maintenance intervention (Failure 2 - S3)

Sequence 4 consists of carrying out a maintenance operation on the Polyprod machine. The purpose is to identify the faulty component in the control cabinet.

The sequence begins with a multiple-choice question displayed on the PC screen:

Beginner	
Questions	Answers
What is the faulty functional chain?	Safety Functional Chain
Choose components that are likely to be defective:	<ul style="list-style-type: none"> • S1 • S2 • S3 • KA1
What is the transformer that supplies power to the KA1 safety relay?	U1
What is the value of the supply voltage of the KA1 safety relay?	24V DC
What is the function of a safety relay?	Safely reset the machine by testing the condition of the safety inputs
Identify the risks associated with the maintenance activity:	Electrical Hazards
What preventive measures are appropriate for the dangerous situations identified?	<ul style="list-style-type: none"> • E.P.I • E.I.S • E.P.C

Following the MCQ, the headset is asked to be replaced.

It is now necessary to place the equipment and tools necessary for the intervention in the toolbox.

The following are mandatory for the intervention:

- The helmet
- Insulating gloves (yellow gloves)
- The Glove Tester
- The Temporary Markup Banner
- Construction Warning Sign
- Marker posts
- The insulating mat
- The Voltmeter



Once the tools have been placed in the tool box, you are asked to leave the locker room. All you have to do is walk through the door to validate the step. A warning will sound if the tools and equipment chosen are incorrect.

The markup now needs to be put in place. Place the posts, the red and white ribbon on the poles and then the sign on the same tape. The insulating mat can then be placed on the floor in front of the Polyprod electrical cabinet.



To be able to open the door of the control cabinet, you must first test the gloves. The glove tester must be gripped and released onto each glove, previously grasped in its other hand.



As the gloves have been tested, all you have to do is equip them by letting them go on the appropriate hand, as well as equip the helmet and lower the visor.

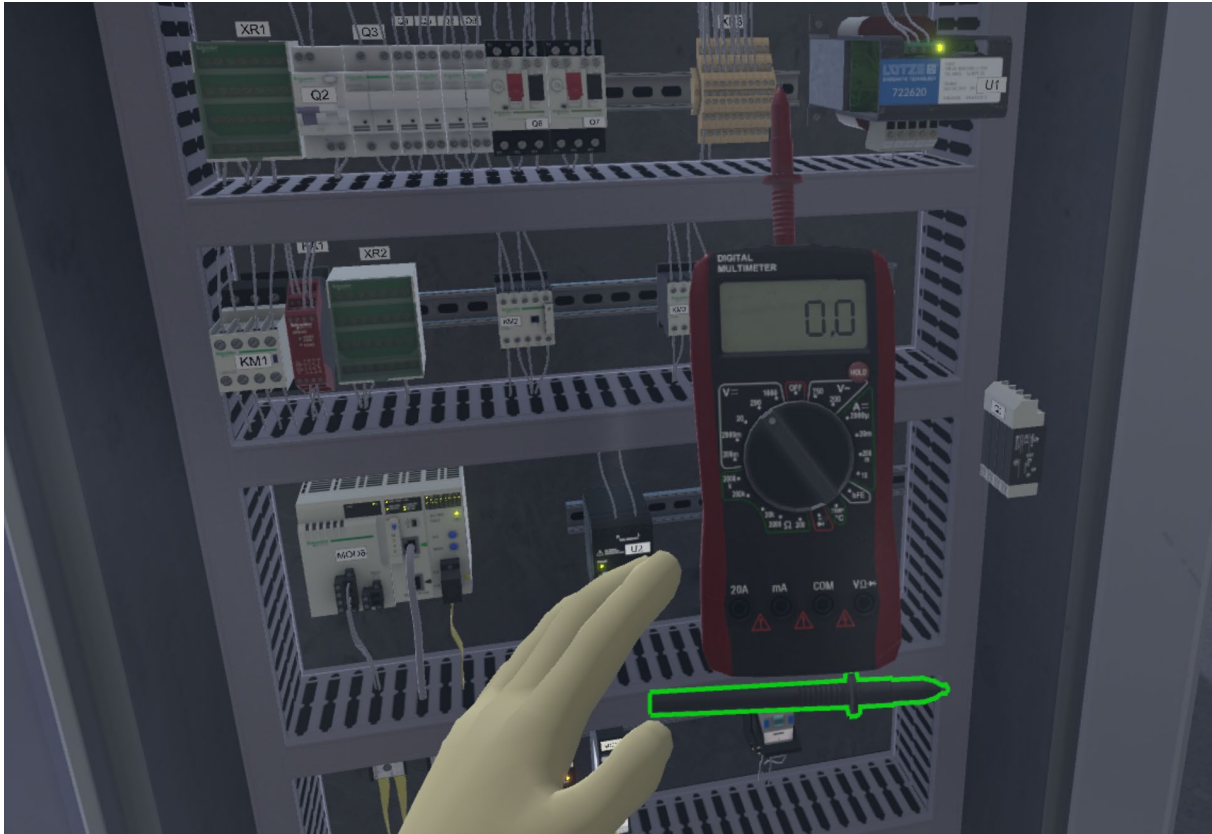
It is then possible to open the door of the control cabinet.



The learner is asked to grasp the voltmeter and set it to 200V DC.



The voltmeter must be grasped with one hand, and with the other it is possible to adjust the gauge via the rotary knob on the front of the tool. Then grasp the secondary tip attached to the bottom of the voltmeter with your free hand while holding down the trigger.



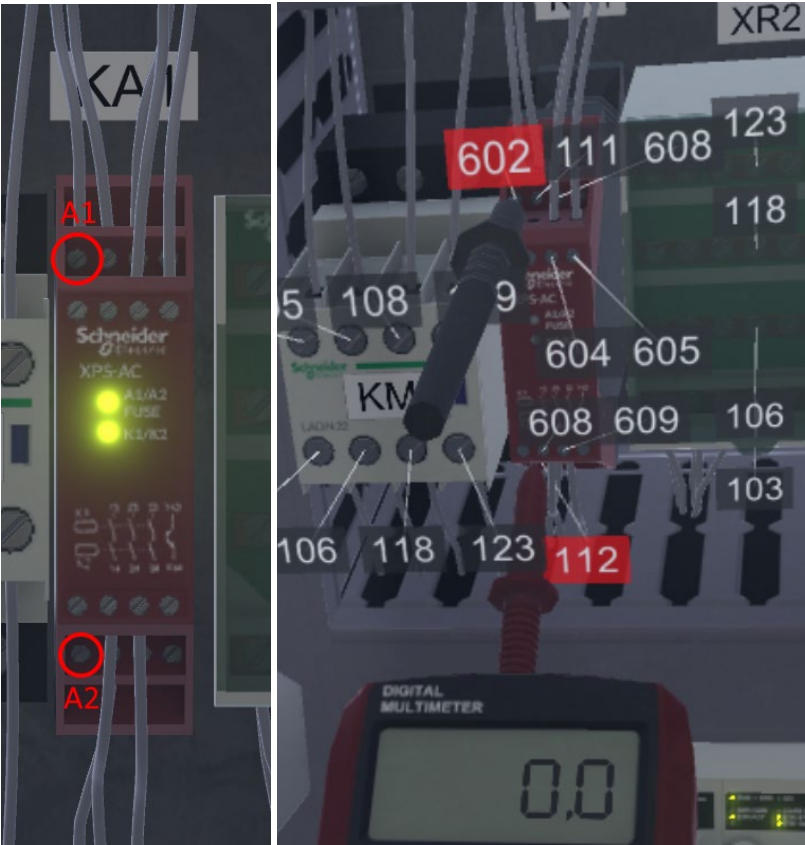
Voltmeter tips can be attached to terminals of electrical components by bringing the tip close to a terminal and holding down the controller trigger.

Several measurements must be made with the voltmeter:

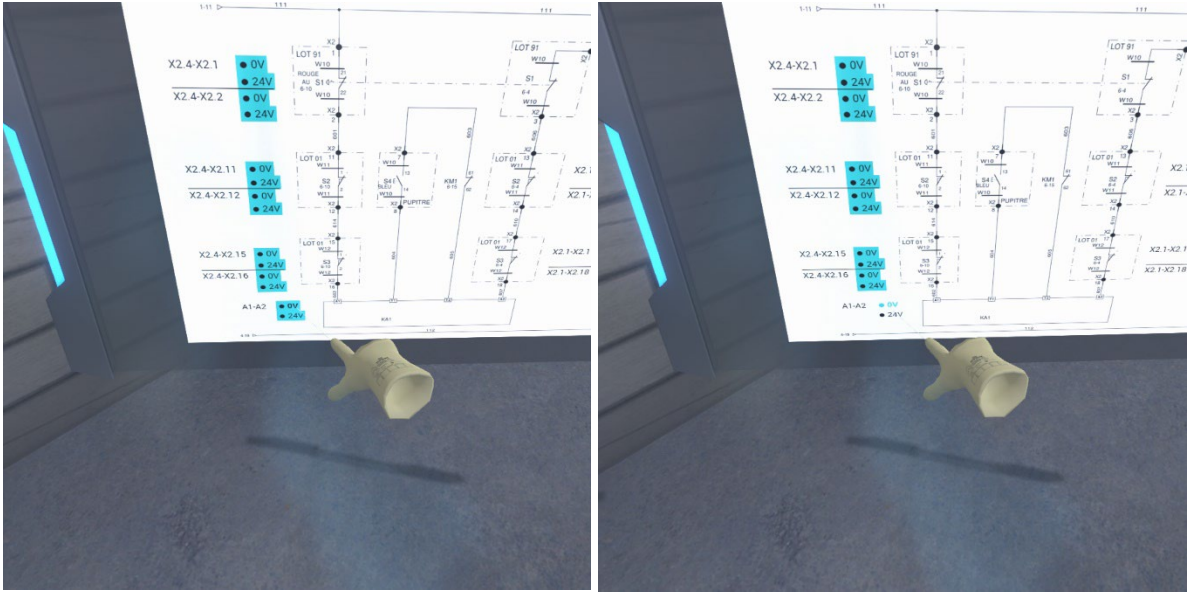
Voltage on component U1 between terminals 111 and 112



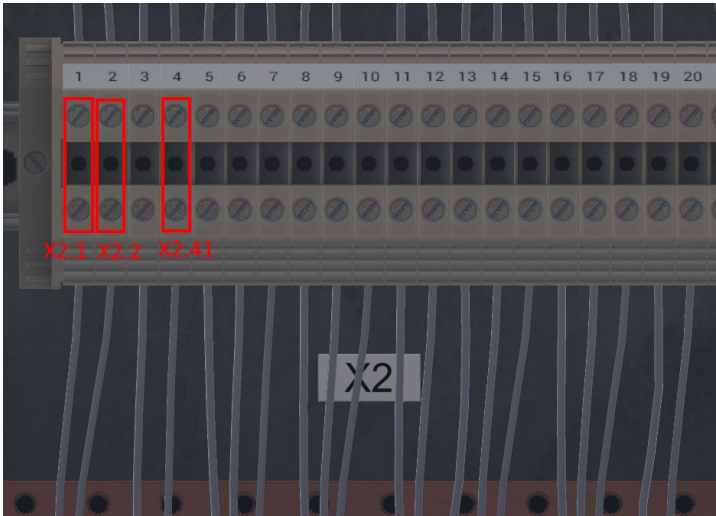
Voltage measurement at KA1 level between A1 and A2 (terminals 602 and 112 respectively)

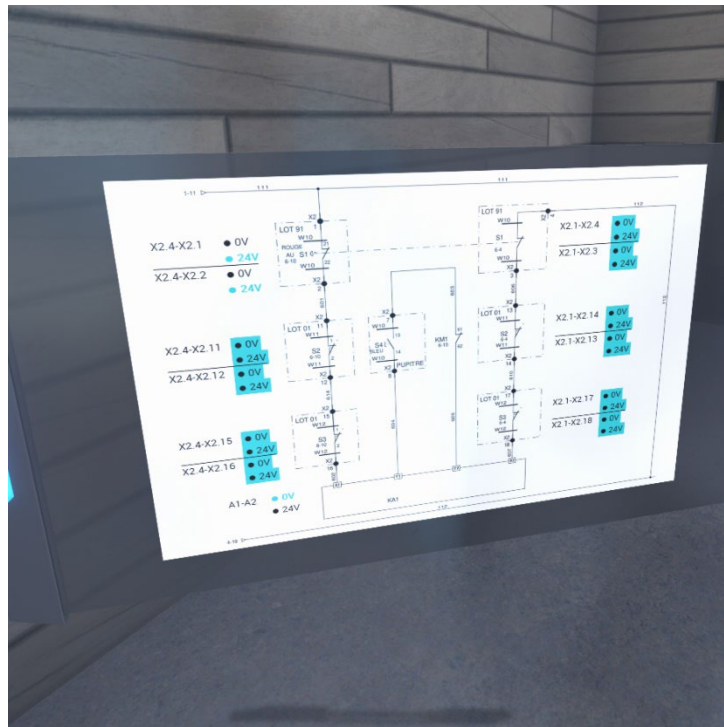


The measurement chart is displayed on the floating screen in the workshop. It is possible to enter the measurements made at the locations indicated on the electrical diagram on this screen. As the inputs are made, they will be asked to enter the voltages measured on this panel.

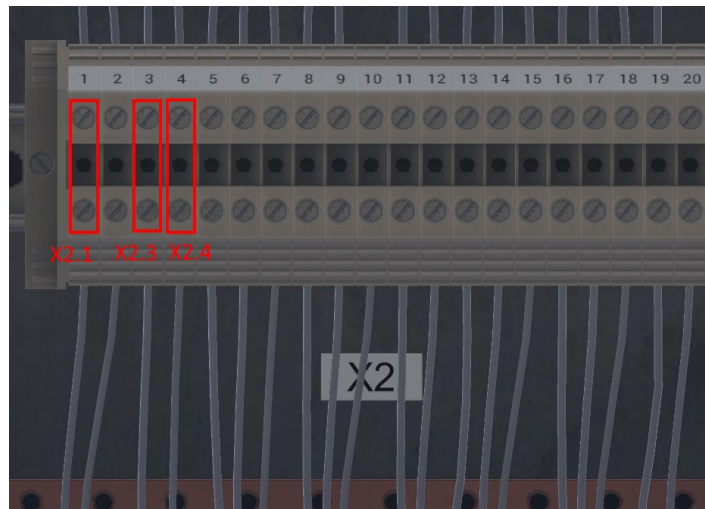


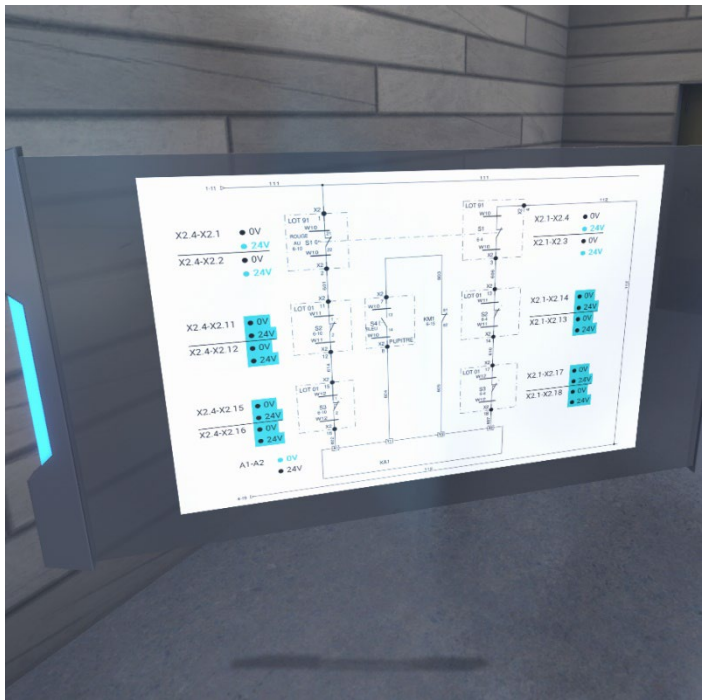
Voltage measurement at terminal block X2 for component S1, between X2.4 and X2.1 (terminals 112 and 111, respectively) and then between X2.4 and X2.2 (terminals 112 and 601)



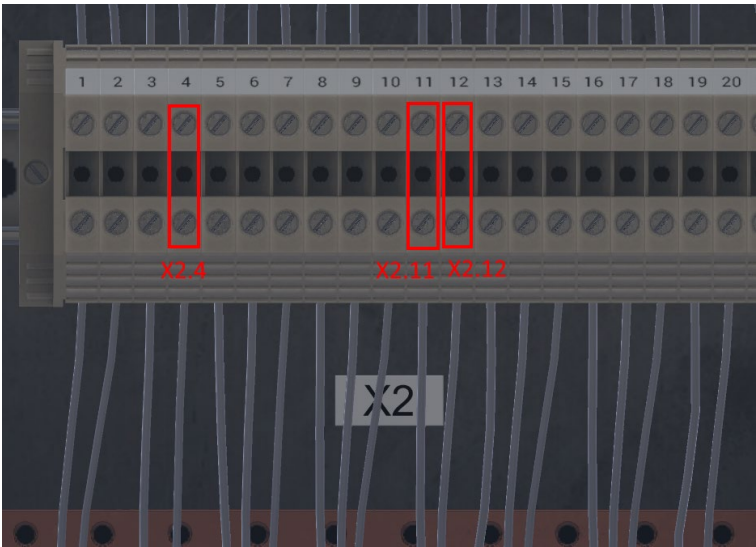


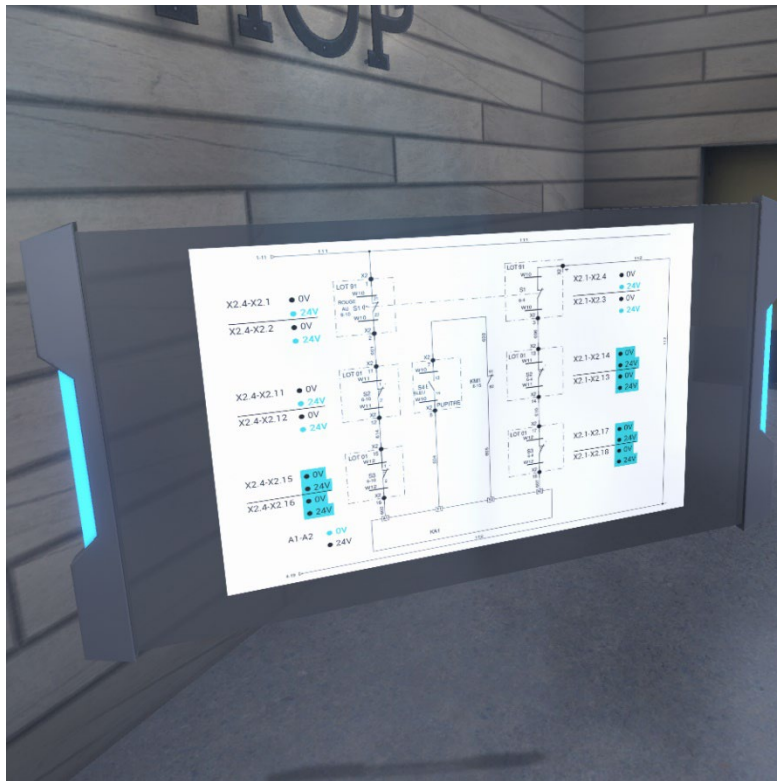
Voltage measurement at terminal block X2 for component S1, between X2.1 and X2.4 (terminals 111 and 112, respectively) and then between X2.1 and X2.3 (terminals 111 and 606)



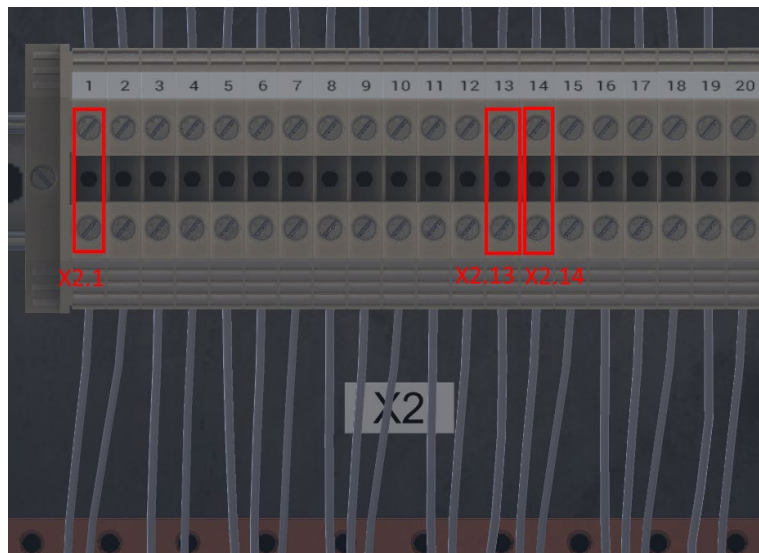


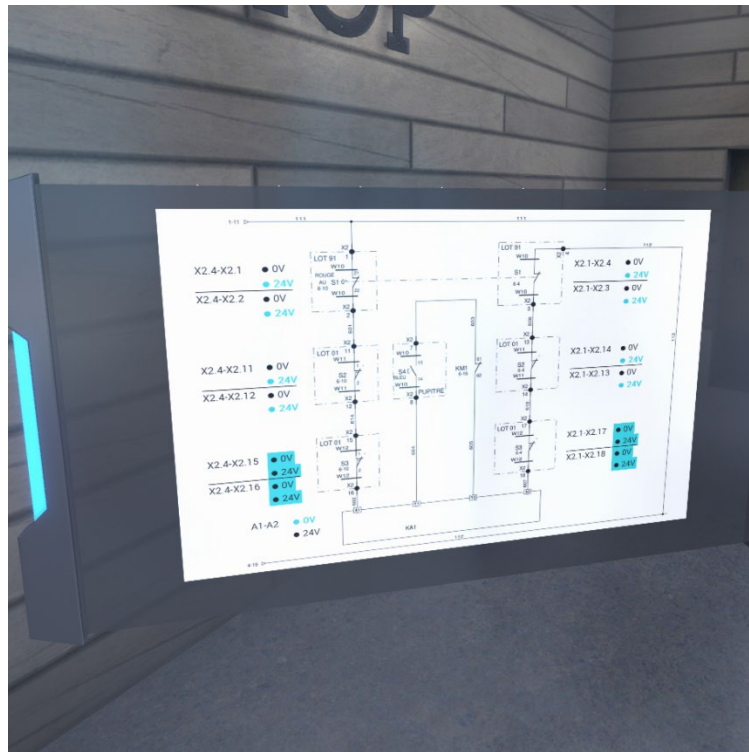
Voltage measurement at terminal block X2 for component S2, between X2.4 and X2.11 (terminals 112 and 601, respectively) and then between X2.4 and X2.12 (terminals 112 and 614)



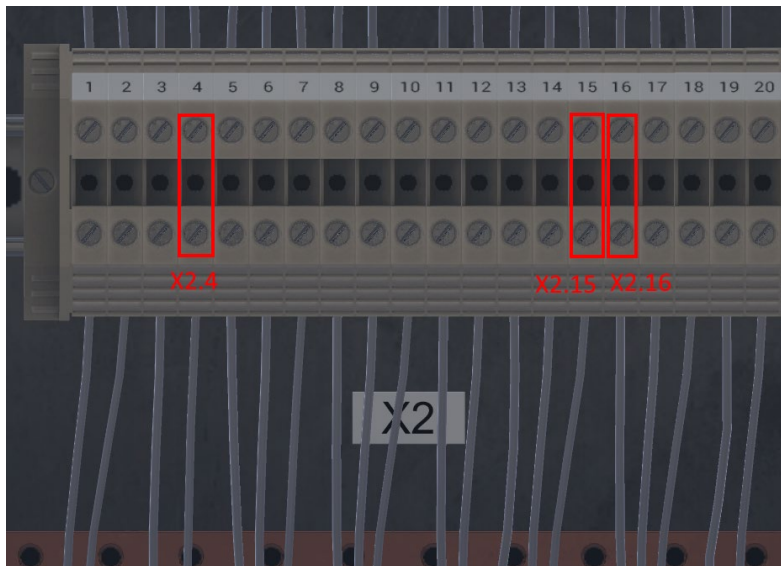


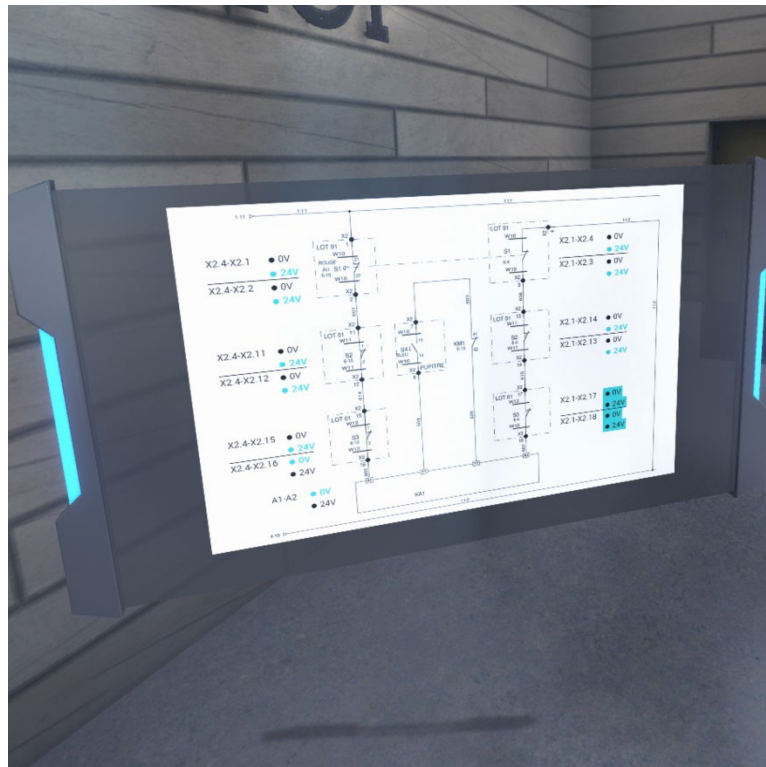
Voltage measurement at terminal block X2 for component S2, between X2.1 and X2.14 (terminals 111 and 610, respectively) and then between X2.1 and X2.13 (terminals 111 and 606)



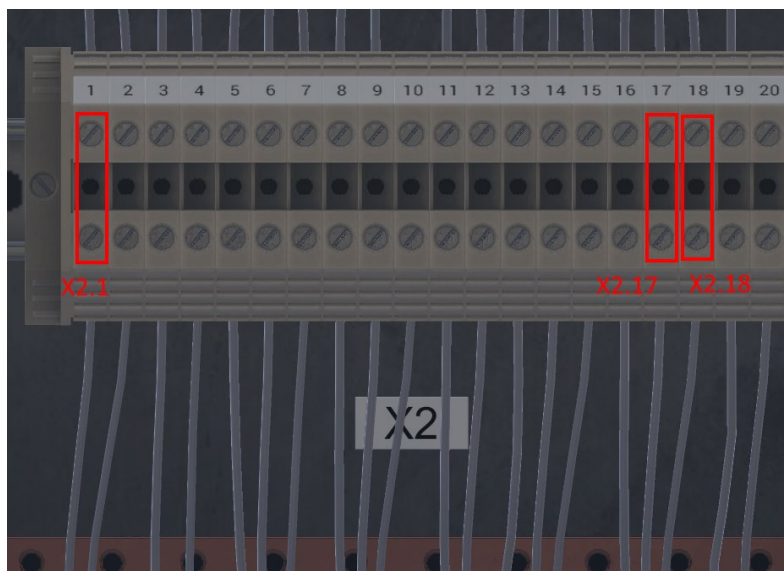


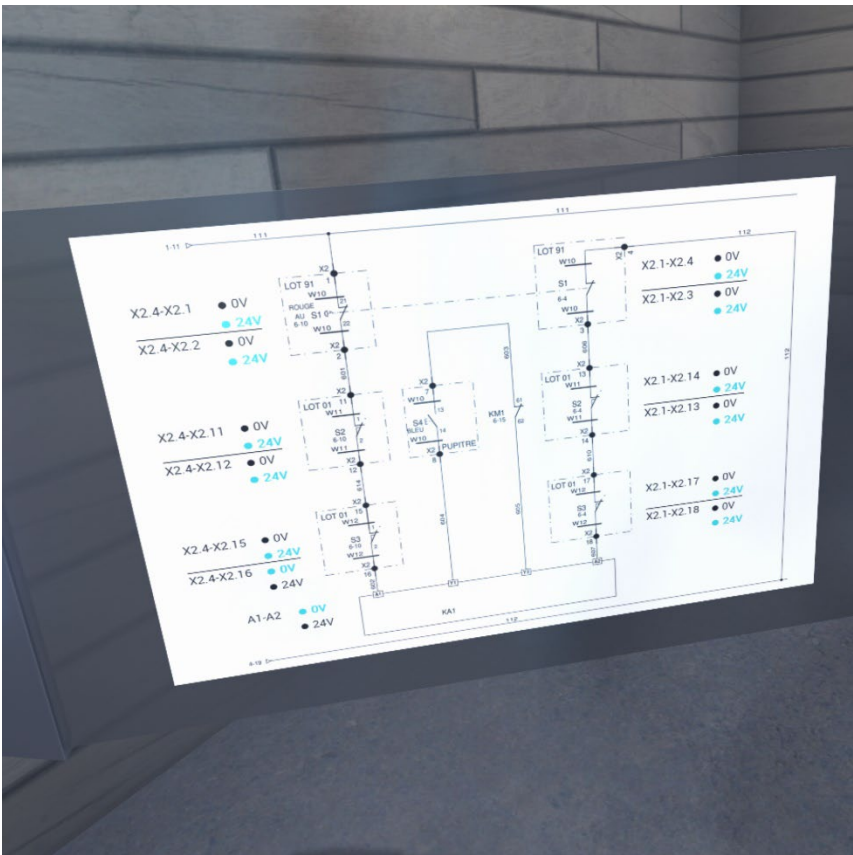
Voltage measurement at terminal block X2 for component S3, between X2.4 and X2.15 (terminals 112 and 614, respectively) and then between X2.4 and X2.16 (terminals 112 and 602)



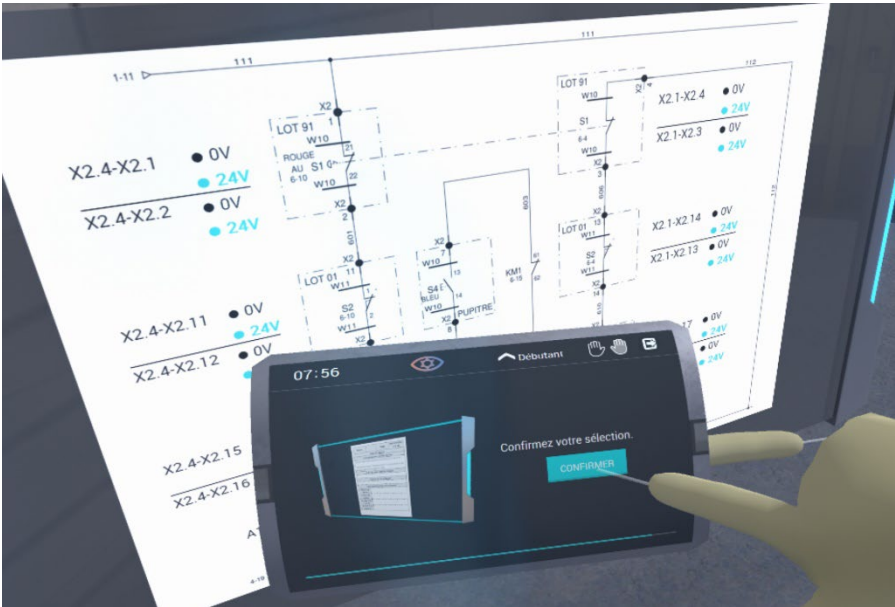


Voltage measurement at terminal block X2 for component S3, between X2.1 and X2.17 (terminals 111 and 610, respectively) and then between X2.1 and X2.18 (terminals 111 and 607)





Once all the tensions have been entered on the diagram, a "confirm" button appears on the tablet on the wrist and allows you to validate the current answers.



To be able to store the voltmeter in the tool box, the secondary tip on the bottom of the voltmeter must be reattached to the blue area.

It is requested to point out the faulty component. This is the S3 component, the door opening sensor on the left side of the control cabinet. Open the door, point in the direction of S3 and click the trigger to end the exercise.

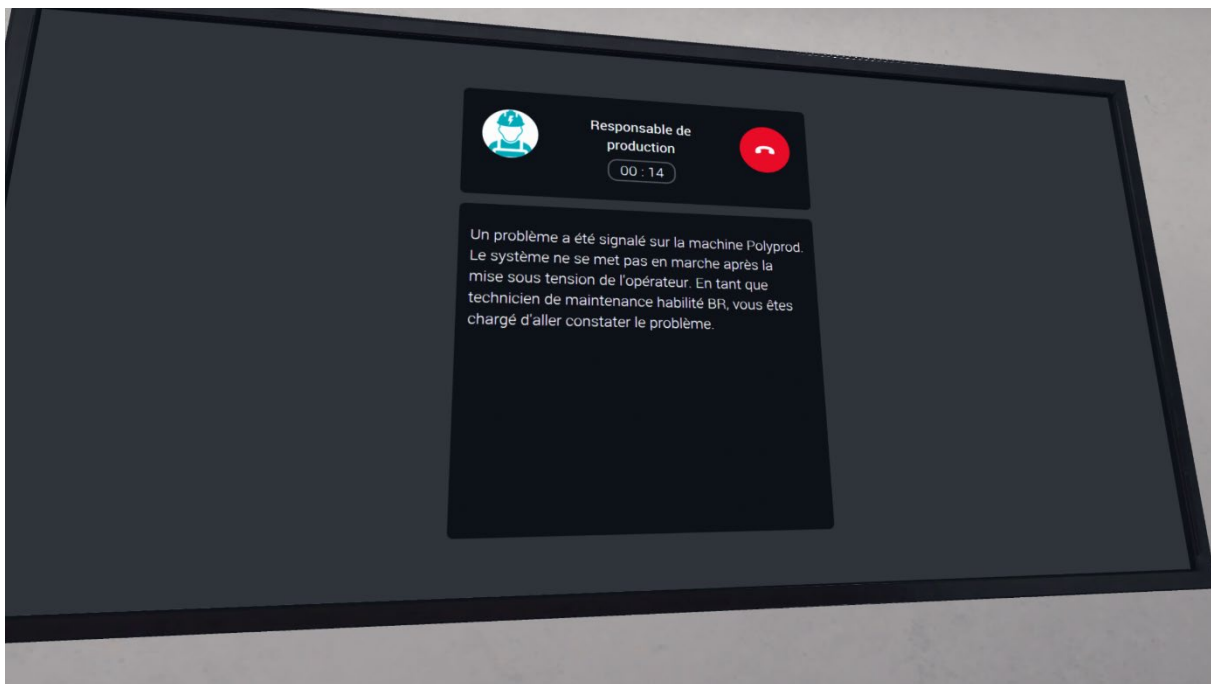
If the S3 component is not located after 2 minutes, the door and sensor will flash blue and the user will lose points.



3.1.5 Sequence 5: Completion of a failure report (Failure 3- U1)

The purpose of this sequence is to prepare for an electrical maintenance intervention that will take place on the Polyprod machine by filling out a fault report.

The sequence begins in the locker room next to the workshop with a call from the production manager on the briefing screen.

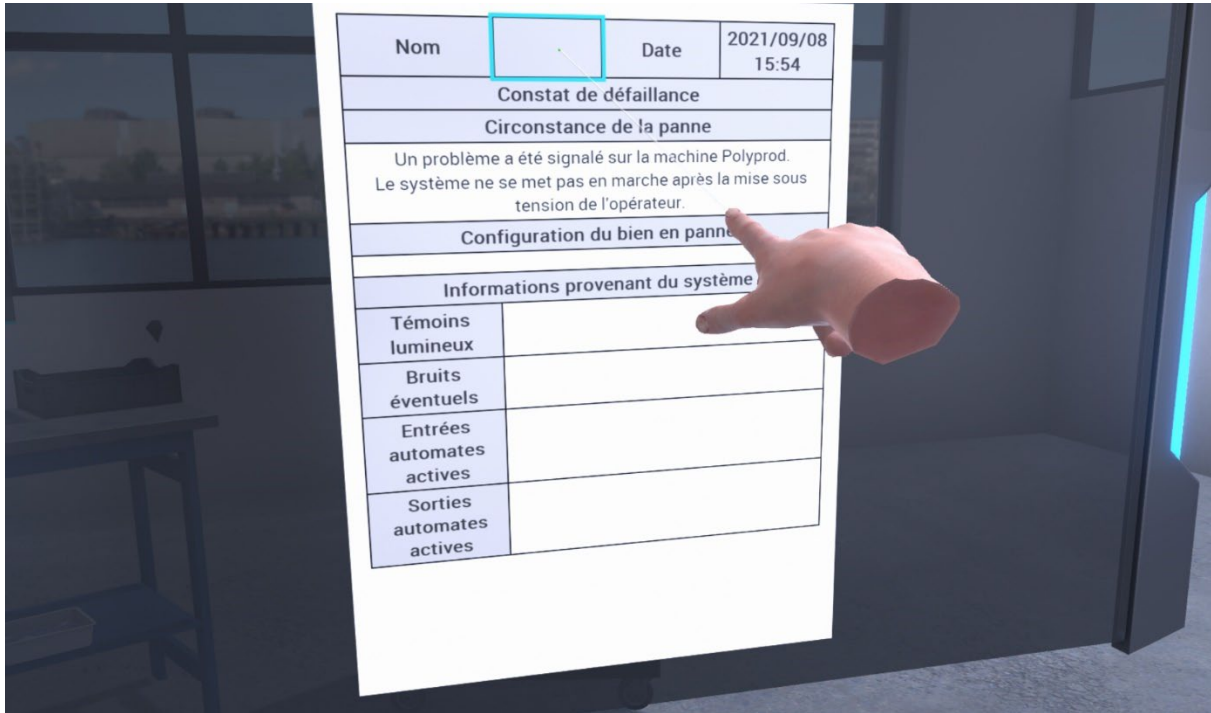


First of all, you are asked to read the defect report displayed on the screen in the workshop and to identify yourself. To do this, you have to leave the locker room through the door separating them from the workshop and reach the screen.



The report of failure screen can be grasped and moved as needed, by gripping it at the wafer with a long press of the trigger.

Identification is done by clicking on the "name" box at the top of the screen.



Once the user has been identified, it is requested to check the status of the system and operate the disconnecter switch. The step is validated after operating the disconnecter switch on the edge of the Polyprod machine, by a sustained click and a rotation.



The next steps will take place on the report of default screen.

It is requested to complete the statement of failure by choosing the correct answer from several proposed. Correct answers will be in bold:

Indicate the failed function:

- The main conveyor belt is not working
- **The system does not boot**
- Dosing doesn't work

Indicate the status of the cylinder and other LEDs:

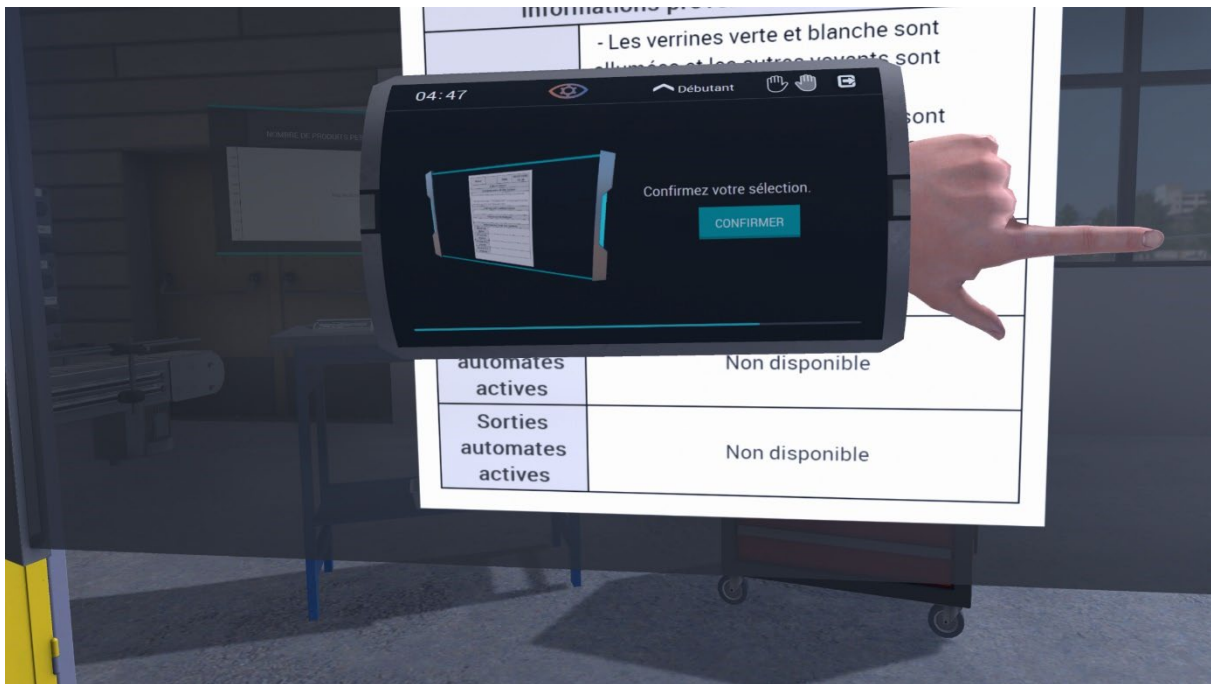
- The green and white verines are on and the other lights are off
- The red and white cylinders are on and the other lights are off
- **No lights are on**

Indicate if the machine makes a noise:

- The machine makes a strange noise
- There is a mechanical shock noise
- **There is no particular noise**

Constat de défaillance	
Circonstances de la panne	
Un problème a été signalé sur la machine Polyprod. Le système ne se met pas en marche après la mise sous tension de l'opérateur.	
Configuration du bien en panne	
<ul style="list-style-type: none"> - Le tapis du convoyeur principal ne fonctionne pas - Le système ne démarre pas - Le dosage ne fonctionne pas 	
Informations provenant du système	
Témoins lumineux	<ul style="list-style-type: none"> - Les verrines verte et blanche sont allumées et les autres voyants sont éteints - Les verrines rouge et blanche sont allumées et les autres voyants sont éteints - Aucun voyant n'est allumé
Bruits éventuels	<ul style="list-style-type: none"> - La machine fait un bruit étrange - Il y a un bruit de choc mécanique - Il n'y a pas de bruit particulier
Entrées automates actives	Non disponible
Sorties automates actives	Non disponible

Finally, you are asked to confirm the selection. It is possible to modify or complete the different choices of the declaration of failure.



Once the report of failure has been completed and the "Confirm" button on the wrist has been clicked, the report of failure is generated in PDF format. This can be found in the records folder, a shortcut of which can be found on the desktop.

In the PDF of the report of failure, the selected responses are in bold. While correct answers are underlined. If a choice is correct it will be displayed in green, otherwise it will be displayed in red, along with the correct answer.

3.1.6 Sequence 6: Electrical maintenance intervention (Failure 3 – U1)

Sequence 6 consists of carrying out a maintenance operation on the Polyprod machine. The purpose is to identify the faulty component in the control cabinet.

The sequence begins with a multiple-choice question displayed on the PC screen:

Beginner	
Questions	Answers
What is the problem identified on the system?	Electrical power supply
The U1 component is	A power supply with rectified voltage
Choose components that are likely to be defective:	Q1 Q3 U1
What is the voltage value of the control part?	24V DC
What is the voltage value of the power part?	400V AC

What is the value of the voltage that needs to be measured across Q3?	400V AC
What is the value of the voltage that should be measured on U1 at the terminals (111-112)?	24V DC
Identify the risks associated with the maintenance activity:	Electrical Hazards
What is the function of Q3?	Short-circuit protection

Following the MCQ, the headset is asked to be replaced.

It is now necessary to place the equipment and tools necessary for the intervention in the toolbox.

The following are mandatory for the intervention:

- The helmet
- Insulating gloves (yellow gloves)
- The Glove Tester
- The Temporary Markup Banner
- Construction Warning Sign
- Marker posts
- The insulating mat
- The Voltmeter



Once the tools have been placed in the tool box, you are asked to leave the locker room. All you have to do is walk through the door to validate the step. A warning will sound if the tools and equipment chosen are incorrect.

The markup now needs to be put in place. Place the posts, the red and white ribbon on the poles and then the sign on the same tape. The insulating mat can then be placed on the floor in front of the Polyprod electrical cabinet.



To be able to open the door of the control cabinet, you must first test the gloves. The glove tester must be gripped and released onto each glove, previously grasped in its other hand.



As the gloves have been tested, all you have to do is equip them by letting them go on the appropriate hand, as well as equip the helmet and lower the visor.

It is then possible to open the door of the control cabinet.



The learner is asked to grasp the voltmeter and set it to 750V AC.



The voltmeter must be grasped with one hand, and with the other it is possible to adjust the gauge via the rotary knob on the front of the tool. Then grasp the secondary tip attached to the bottom of the voltmeter with your free hand while holding down the trigger.

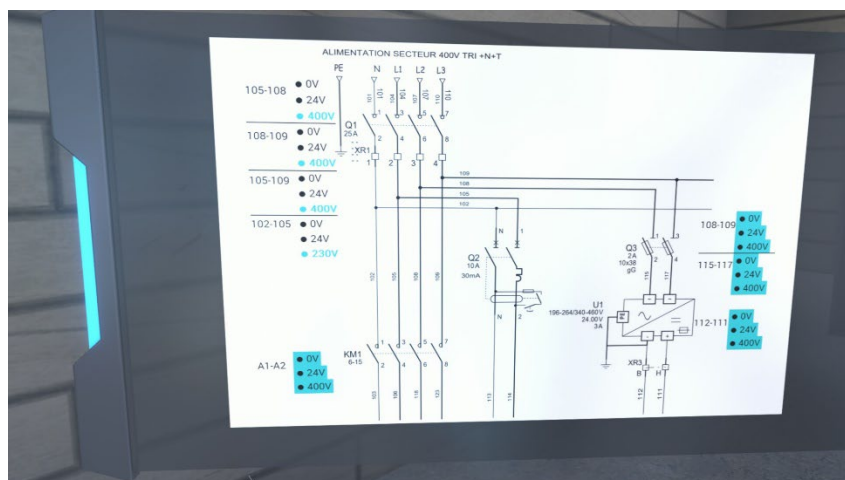
Voltmeter tips can be attached to terminals of electrical components by bringing the tip close to a terminal and holding down the controller trigger.

Several measurements must be made with the voltmeter:

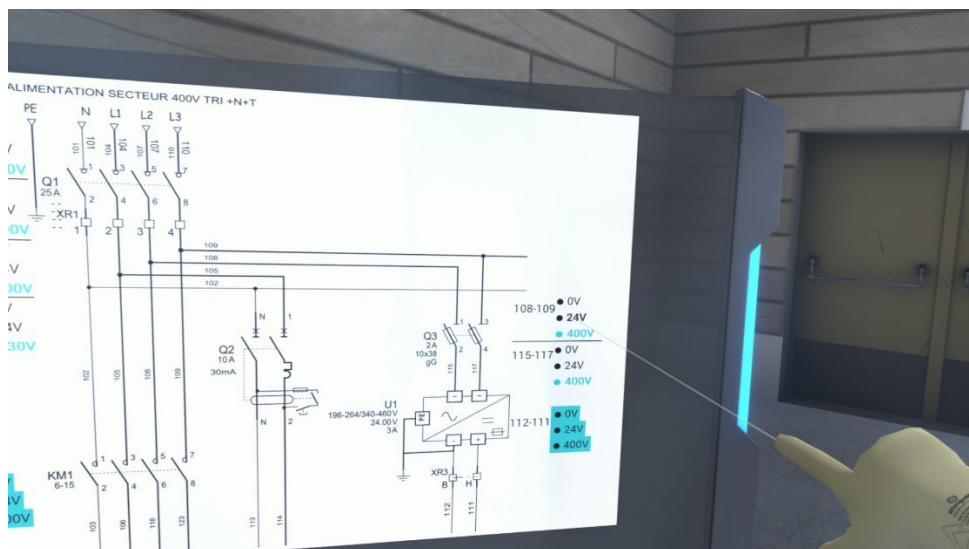
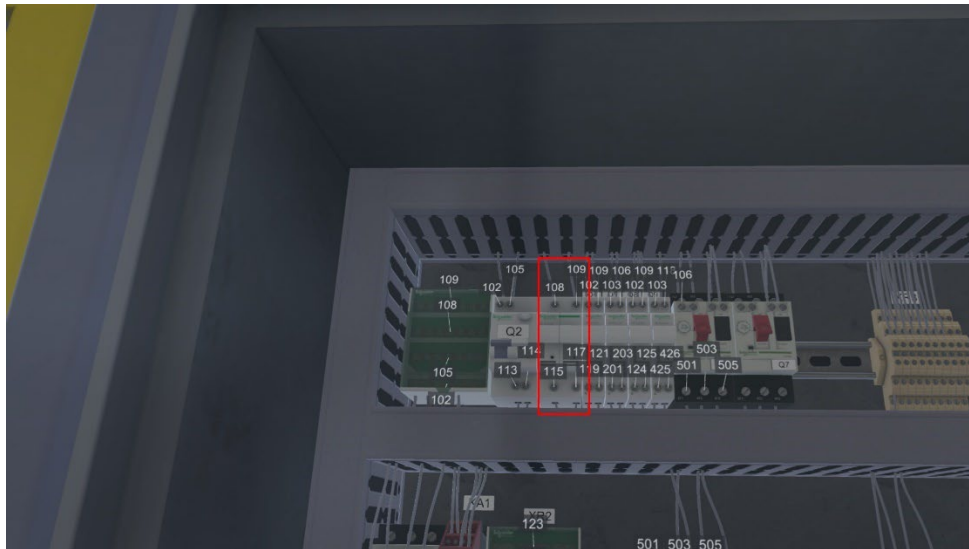
Voltage measurement on the Q1 disconnect switch between terminals 105-180, 108-109, 105-109, 102-105



The measurement chart is displayed on the floating screen in the workshop. It is possible to enter the measurements made at the locations indicated on the electrical diagram on this screen. As the inputs are made, they will be asked to enter the voltages measured on this panel.



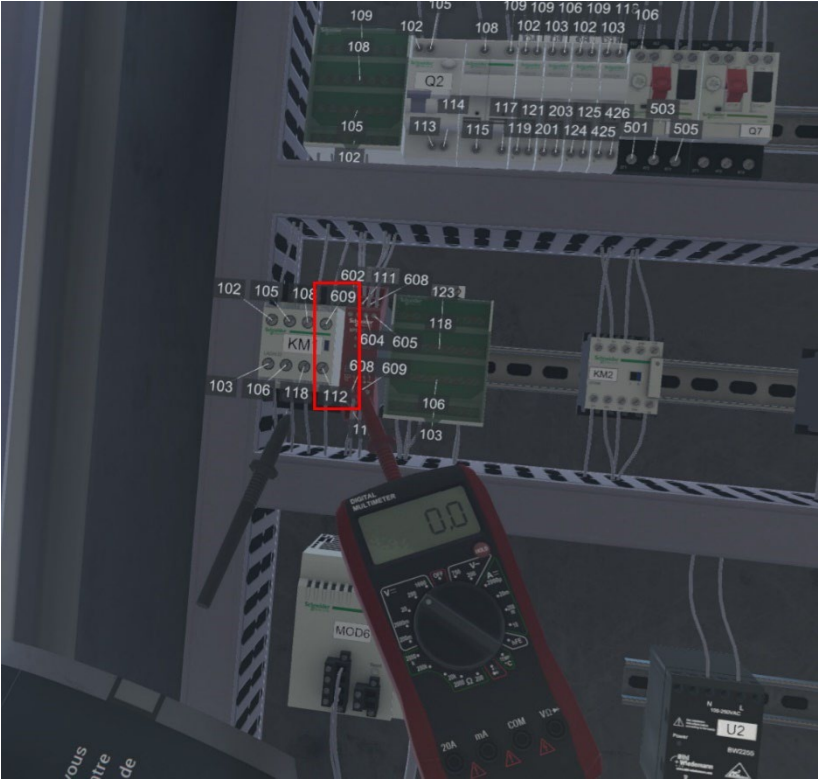
Measurements on the Q3 fuse holder between terminals 108-109, 115-117

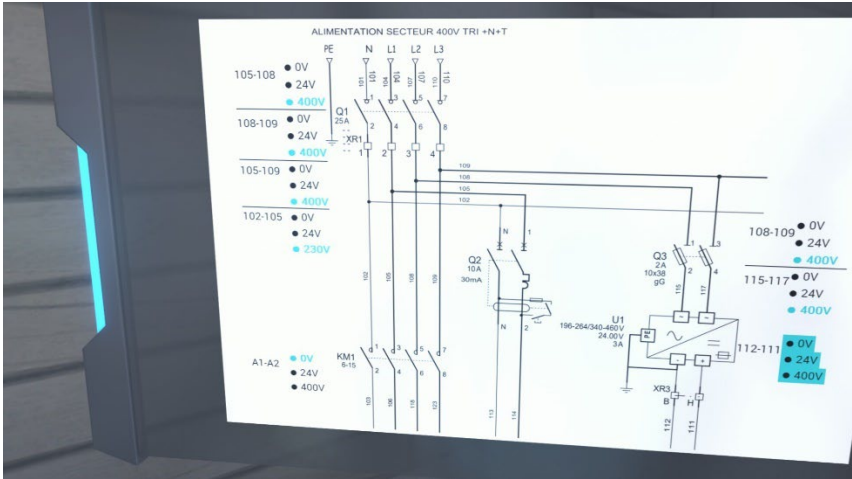


The learner is then asked to set the voltmeter to 200V DC for the following measurements

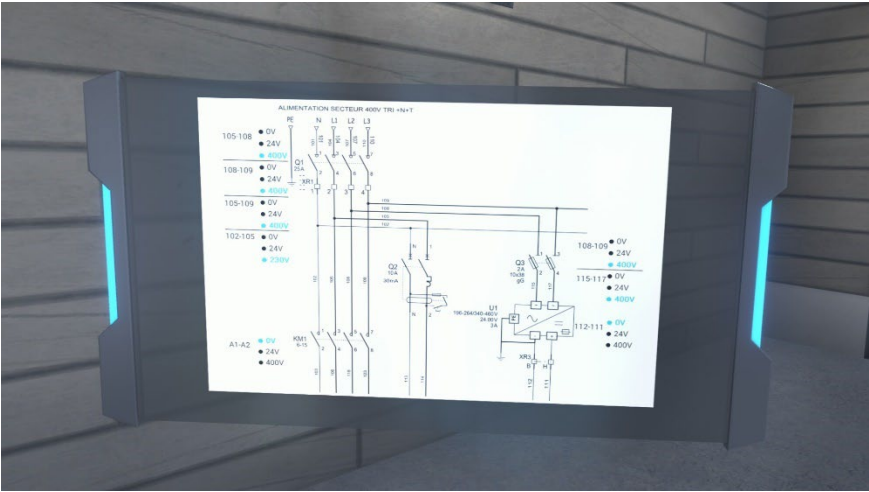


Measurements on the KM1 Contactor Between Terminals A1 and A2 (609-112)

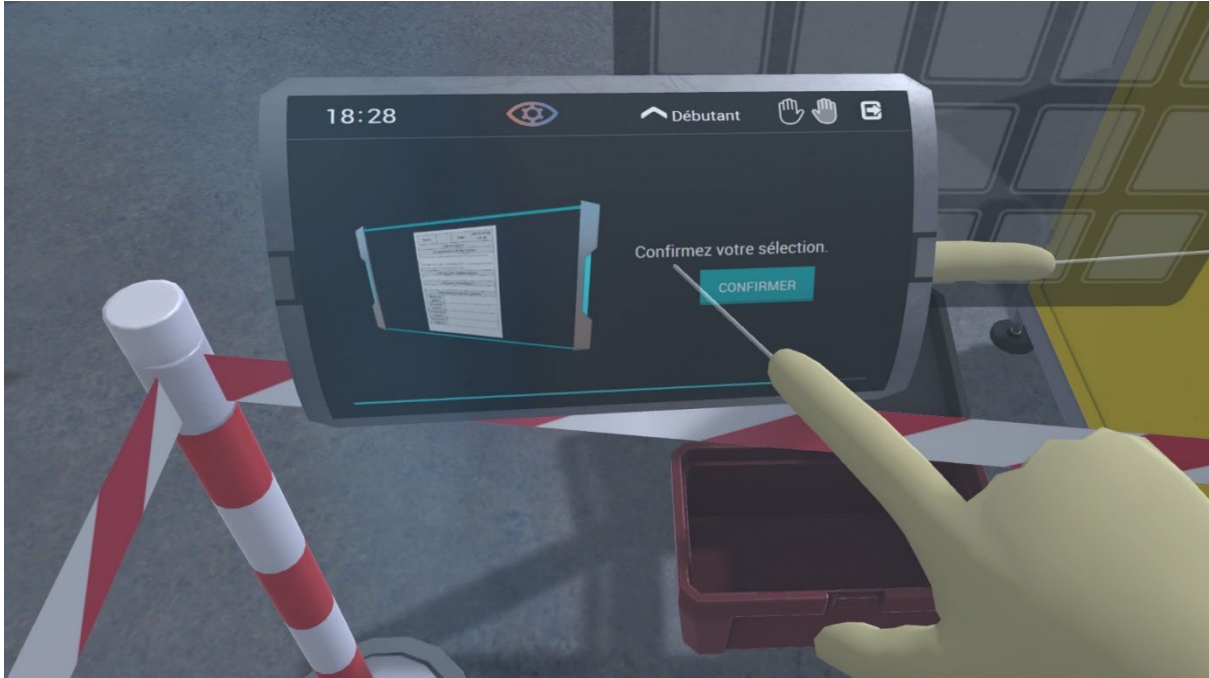




U1 Power Measurements Between Terminals 112-111

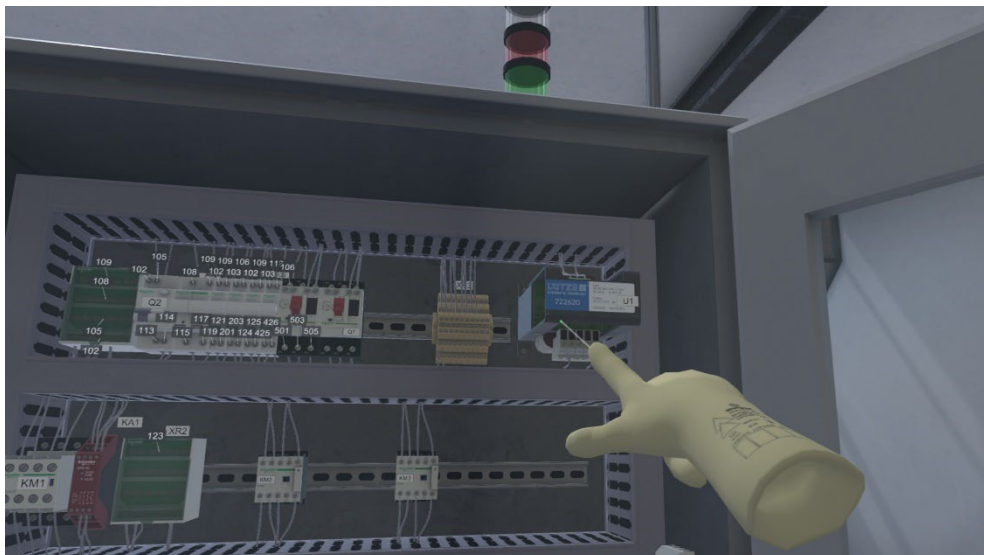


Once all the tensions have been entered on the diagram, a "confirm" button appears on the tablet on the wrist and allows you to validate the current answers.



To be able to store the voltmeter in the tool box, the secondary tip on the bottom of the voltmeter must be reattached to the blue area.

It is requested to point out the faulty component. This is the U1 power supply at the top right of the control cabinet. Point in the direction of U1 and click the trigger to end the exercise. If the U1 component is not located after 2 minutes, it will flash blue and the user will lose points.



Clicking on the "Results" button will end the exercise

