



Virtual Indus "Habilitation B1V, BR, BS, B2-BC

Virtual reality training unit for electrical accreditation in accordance with standard NF C 18-510

The Virtual Indus ERM training cell

At the forefront of innovation in didactic solutions for technological and vocational training, ERM is developing a **virtual reality training unit for industrial professions: "Virtual Indus"**.

Designed for both **initial and continuing training**, Virtual Indus combines a **hardware environment** incorporating the **latest 3D technologies** with **training scenes** designed in cooperation with training experts on the trades/technologies covered in the scene. This training cell is ideal for **the acquisition, consolidation and assessment of professional skills**.

Once the Virtual Indus training cell "**hardware environment**" (ref: VI06 or VI07) has been acquired, training establishments can gradually invest in the "**Virtual Training 3D Scenes**" (ref: VSxx) available in the library.

The first 3D scenes were developed for **production line control, industrial maintenance and electrical training** (tertiary and industrial...). Our library of 3D scenes is **constantly expanding**.

Virtual Indus integrates the **Vulcan environment**, a platform for real-time management of skills and associated indicators. It manages learners, learning paths and results, and integrates with existing ENT and LMS systems.

Virtual Indus is supplied with accompanying documents in digital format, including:

- ✓ Installation and operating instructions
- ✓ Description of virtualized systems integrated into 3D scenes
- ✓ Vulcan training area (management of activities, learners, results, etc)

Bac Pro ELEEC, PLP, MEI, TISEC/TMSEC/TFCA

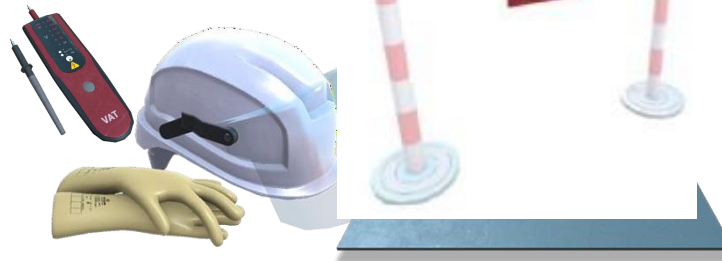
BTS MS, FED, Electrotechnics

IUT GEII, GIM, GMP

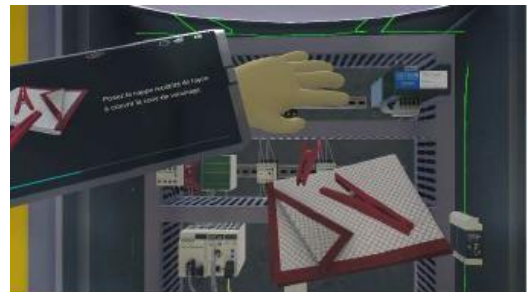
Watch the videos on our channel



In partnership with



Virtual Indus with 3D production line control scene using the Polyprod system



The Virtual Indus ERM training cell

- ✓ An **offer tailored** to different **needs**
- ✓ **Putting learners into situations** in different contexts and original systems is often difficult to integrate into a training platform.
- ✓ A **virtual experience as close to reality as possible** (head and hand tracking, virtualized objects, etc.).
- ✓ A **multiplication of learning situations** to **accelerate the development of professional skills**
- ✓ Hands-on activities with complete autonomy and the "right to make mistakes", **without risk to the learner or the equipment**.
- ✓ **Individualized training** with **tracking of learning paths** (Vulcan training space)

More information at www.erm-automatismes.com



General information on virtual reality

Virtual reality for industrial training

In recent years, virtual reality has been increasingly used in industry in a variety of ways.

1) Driving simulation / piloting: The best-known applications of virtual reality, driving simulation workstations validate the end-user's experience by combining the physical and the virtual.

2) Optimizing industrial designs: Anticipate and prepare for all process and product-related operations during the lifecycle:

Virtual reality can be used to improve and validate assembly, and anticipate and validate the feasibility of operations such as servicing or maintenance.

3) Ergonomic design of production workstations: Virtual mock-ups help to anticipate problems of musculoskeletal disorders (MSDs), speed up the workstation design process, detect risks and malfunctions, and encourage teams to take ownership of workstations.

4) Training in technical gestures and situations: Virtual reality training applications enable you to...:

- ✓ Acquire the best technical gesture/decision using multi-criteria analysis
- ✓ Improve the quality of training through hands-on learning of gestures and skills
- ✓ Optimize investments (uptime), reduce technical floor space and labor costs



Complementarity of Virtual Reality & Serious Games

✓ Why **Serious Games**?

- Learning knowledge
- Discover the day-to-day workings of a profession (e.g. understanding a specification, presenting a solution to a customer, preparing for an intervention, etc.).

✓ Why **virtual reality**?

- Training in professional gestures/skills in real-life situations

✓ The ideal solution: insert virtual reality scenes into Serious Games scenarios



Industrial training, an obvious application for virtual reality

- ✓ No major technical hurdles (many applications already in use in industry)
- ✓ A pool of 3D systems and models available in workshops
- ✓ Many possible teaching scenarios:
 - Troubleshooting operations
 - Measurement, parameterization and commissioning
 - Managing complex production lines
 - Electrical certification
 - Component removal/replacement (corrective maintenance)
 - -



An ideal response to the evolution of initial and continuing training courses

- ✓ **Attractiveness of the solution** for learners
- ✓ **Original situations** that would be impossible to reproduce in a training environment (battery maintenance, nuclear/marine/rail environments).
- ✓ **Continuous** enhancement and **evolution of the system** with new 3D scenes
- ✓ **High cell utilization:** whatever the training sequence, a 3D scene can meet a need
- ✓ **Individualized** training path
- ✓ -

Creating a 3D training scene

A 3D virtual training scene is based on a pedagogical scenario defined with a team of trade/technology training experts. This scenario defines the skills, associated knowledge and gestures to be acquired in the scene.

This scenario is then transformed into a 3D scene during a software development phase:

- ✓ Scene creation in the physical 3D rendering engine from a SolidWorks 3D model and/or computer-generated photos/videos
- ✓ Create and run the virtual scenario with the virtual reality application creation and deployment software suite

Hardware environment

Equipment for the Virtual Indus training unit

Virtual reality headset :

- ✓ HTC Vive virtual reality headset with a screen for each eye (1200 x 1080 px), an inertial measurement system (accelerometer, gyrometer) and position sensors to adjust the projected image.
- ✓ Wireless joysticks (x2) with inertial measurement system (accelerometer, gyrometer) and position sensors for hand movement in the virtual reality environment
- ✓ Infrared emitters (x2) supplied with professional adjustable tripods (mobile installation) and mounting brackets (fixed installation) for positioning helmet and joysticks in the riding area.
- ✓ Workstation supplied (two models available) :
 - Tower workstation with display including keyboard and mouse, Windows 10 (ref **VI06**), storage and transport case (ref **VI08**)
 - Portable workstation with 17.3" screen including speakers, Windows 10 (ref **VI07**) and storage and transport case.

Virtual intervention zone: Virtual Indus Premium

- ✓ Large U-shaped projection speaker
 - The virtual intervention zone consists of a U-shaped area with 4 screens and 4 professional video projectors LxPxH=3x3x2.5m
 - Projection on all three sides and on the floor
- ✓ Sound immersion
 - The presence of loudspeakers makes it possible to associate the scene with an immersive sound environment that can play a role in the acquisition of gestures and skills (e.g.: abnormal noises in maintenance...).
- ✓ 3D vision and motion
 - The learner is equipped with 3D glasses for 3D immersion in the scene
 - His head and hands are equipped with 3D trackers, allowing him to follow his movements in the 3D scene.
- ✓ Virtualized objects (virtual toolbox) - *Coming soon*
 - The learner is provided with real objects equipped with position sensors (wrenches, screwdrivers, multimeter).
 - These objects allow you to perform technical gestures close to the reality of the trade
 - *In certain scenes, more complex virtualized objects (with vibration generators, force feedback, loudspeakers, etc.) can be offered. These specific objects are then sold with the 3D scene.*
- ✓ Tower-format workstation with display including keyboard, mouse and speakers. The workstation houses the software and applications required to run the system (ref **VI00**).



Choice of sequence



Choice of level: beginner, advanced or expert



Software environment

Virtual Indus integrates **major** cross-cutting **functionalities** available for each training module, in particular for **moving, interacting with and activity management**.

Movement and interaction are managed by the Virtual Indus hardware, including the helmet (or goggles), controllers and tracking device.

The tracking device accompanied by the **helmet or goggles** allows :

- ✓ Stereoscopic viewing of scenes (3D vision)
- ✓ Geolocate the user, in particular his head and eyes, to adapt the 3D scene to his vision

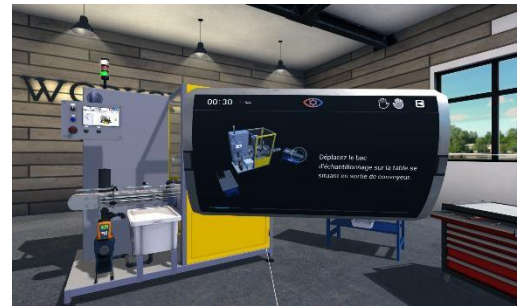
The **joystick buttons** allow you to :

- ✓ Interact with the virtual environment and objects in the scene, with the ability to pick them up, move them and put them down.
- ✓ Teleport from one location to another to overcome the physical constraint between the size of the virtual scene and the actual physical evolution zone.
- ✓ Zoom in on a section, take screenshots, etc.

Activity management is handled by a virtual desktop featuring a **virtual home screen** for :

- ✓ **Identify the user** by name and class to track activities completed or to be completed, and view results and progress in the training program (Vulcan environment).
- ✓ **Choose an activity** (free mode) or perform an activity predefined by the trainer (curriculum mode)
- ✓ **Choose the virtualized hardware** on which the learner will work (production system in a factory, electrical installation in a commercial building (free mode)).
- ✓ **Choose the training module** and associated level of difficulty (beginner, advanced and expert). Each training module includes a scenario and a 3D scene. The various training modules are classified by major category (maintenance, production, electrical engineering, energy).
- ✓ **Access general 3D scene parameters** (language selection, volume level, recording, etc.)

Other functions are implemented, such as **activity guidance** with a **tablet connected to the handle**, sound message broadcasting, etc.



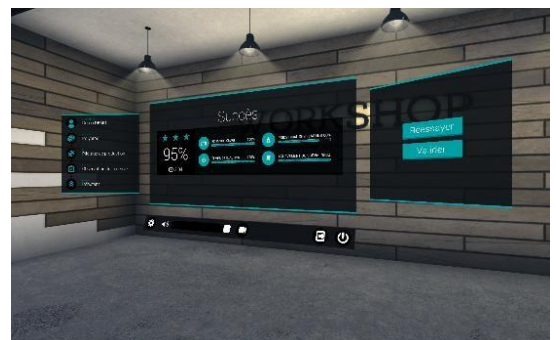
Vulcan environment features

Virtual Indus integrates the **Vulcan environment**, either locally or in the cloud, with the following key features:

- ✓ **Management of training courses, classes, groups, learners, training paths, pedagogical activities**
- ✓ **Real-time monitoring** of each learner's professional **skills** and analysis of results.
- ✓ Recording of the scene for subsequent visualization, enabling **analysis of the fault(s)** and **objective remediation proposals** (knowledge, method, etc.).

Vulcan allows the trainer to **interact with the training course** in a spirit of **individualization**.

Vulcan integrates into existing ENT and LMS systems.





"Habilitation B1V, BR, BS, B2-BC

Virtual reality training unit for electrical accreditation in accordance with standard NF C 18-510

Electrical clearance & ERM Virtual Indus "Habilitation" virtual training unit

Virtual Indus Habilitation is a variation on Virtual Indus, with **3D scenarios for acquiring and consolidating practical skills combined with theoretical knowledge of electrical empowerment.**

In order to obtain the **NFC 18-510** electrical clearance, the employer must ensure that the employee has received theoretical and practical training in the risks associated with electricity, and in the measures to be taken to intervene safely when carrying out the operations entrusted to him/her.

Electrical certification consists of two main stages:

- Acquisition of theoretical knowledge
- Practical skills acquisition.

Virtual Indus Habilitation has been designed with this in mind, enabling learners to apply **practical skills (know-how and interpersonal skills)** during theoretical training, with the "right to make mistakes" without risk to themselves or the equipment. Virtual Indus Habilitation places the learner at the heart of the training program, allowing the trainer to "rediscover" his or her pedagogical role.

Virtual Indus Habilitation is not a substitute for practical activities in real-life situations, but **rather a gas pedal for the acquisition of reproducible behavioral automatisms that can be transferred to the real world.**

Virtual Indus Habilitation is available with the Electrical Habilitation training modules:

- ✓ For **B1V electricians** (working on an industrial system)
- ✓ For **BS basic supervisors** (working on a tertiary installation and working on an industrial electrical cabinet)
- ✓ For **BR general supervisors** (working on an industrial system)
- ✓ For **B2- BC work and consignment supervisors** (activity on an industrial system)

Other certification training modules are currently being developed. Please contact us

All the modules provided include contextualized scenarios with practical activities designed to achieve more than just electrical clearance tasks.



"Habilitation" regulations & Virtual Indus

Virtual Indus Habilitation's training modules have been designed and produced by expert trainers with reference to official documents:

- ✓ **Standard NFC 18-510** "Operations on electrical installations and structures and in an electrical environment - prevention of electrical risk",
- ✓ **Decree no. 2010-1118 of September 22, 2010** on operations on electrical installations or in their vicinity
- ✓ The guides associated with this standard :
 - **UTE C 18-510-1** "Recueil d'instructions de sécurité électrique pour les ouvrages" for operations on structures (electricity transmission and distribution networks)
 - **UTE C 18-510-3** "Electrical safety requirements for operations carried out on electrical installations or in their environment (excluding electricity production installations)".
 - **UTE C 18-531** "Electrical safety requirements for personnel exposed to electrical risk during non-electrical work and simple electrical work".
 - **UTE C 18-540** "Prescriptions de sécurité électrique pour les opérations basse tension sur les installations et les ouvrages hors travaux sous tension" (Electrical safety requirements for low-voltage operations on live installations and structures)

Keep up to date with our new products





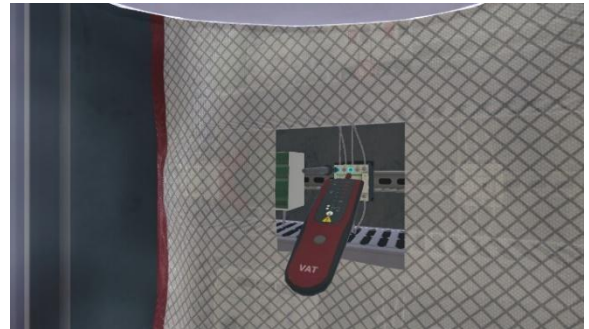
B1V

Library of available scenarios



Module: Electrical accreditation for B1V (electricians) with work on Polyprod dosing/ capping cell

- ✓ The main aim of this module is to **carry out an electrical operation in a reinforced LV neighborhood zone (zone 4), with the installation and removal of an insulating blanket.**
- **Situation:** The maintenance manager (B2V works manager) is called by the machine operator, who has noticed a malfunction. He has concluded that the KM2 contactor in the plug distribution circuit is faulty. The electrician has to change this contactor off-line.
- **Objectives:** To change a de-energized contactor (preliminary intervention by the BC for equipment consignment) using the correct personal protective equipment (PPE), individual safety equipment (ISE) and collective protective equipment (CPE), while complying with orders and instructions and behaving in a manner appropriate to the risks involved.
- **Learner activities:**
 - Receive and sign work order
 - Choosing the PPE, EIS and EPC required for the operation
 - Get to the site with the chosen equipment
 - Fit PPE after checking its condition
 - Install EIS and EPC (insulation mat and insulation blanket)
 - Carrying out a no-voltage check (VAT)
 - Remove PPE
 - Replace contactor
 - Re-equipping with PPE to remove EIS and EPC
 - Sign the completion certificate
 - Restarting the system after the PO's intervention



✓ **Reference:**

VS10-04-1: Virtual training module: Electrical empowerment for B1V (electricians) with intervention on Polyprod dosing/ capping cell - 1 license.
Variants are available for several licenses for the same establishment or for rental - Please contact us for further information.

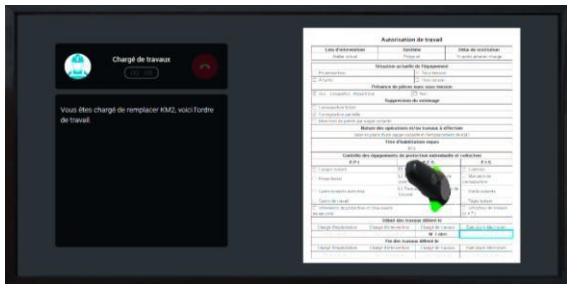


Illustration of intervention preparation activity

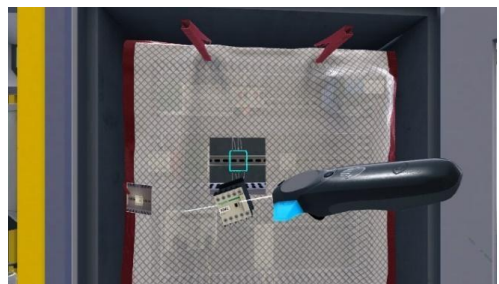
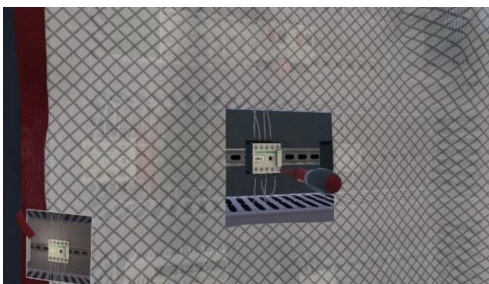


Illustration of contactor replacement


BS

Library of available scenarios

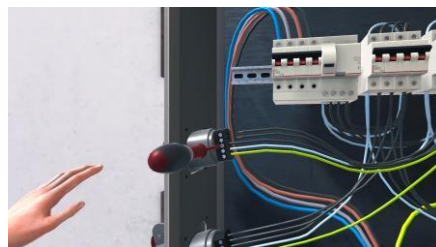
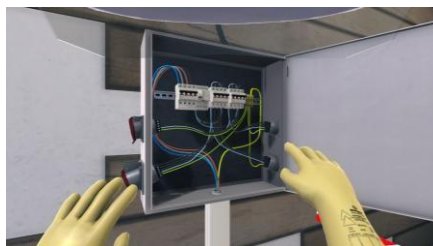
Module: BS electrical empowerment (basic intervention supervisor)
2 sequences (industrial work on 400V socket outlets and tertiary work on 230V sockets and lighting)

 Video on
**You
 Tube**

- ✓ The main aim of this module is to **carry out a basic low-voltage intervention on a de-energized installation element outside zone 4.**
- ✓ The training module consists of **2 sequences**

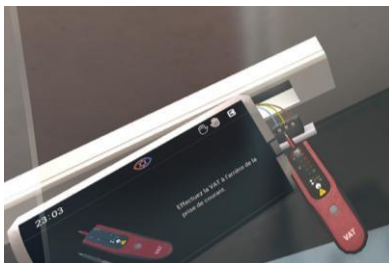
Sequence 1: Work on a 400V socket in an industrial cabinet

- **Situation:** The operations manager is called by the machine operator, who has noticed damage to two three-phase 400V (32A and 63A) Hypra-type sockets integrated into a box supplying the production system. The operations manager asks for the plugs to be replaced, and authorizes the basic intervention supervisor to carry out the replacement off-line.
- **Objectives:** To carry out the replacement of de-energized three-phase sockets using the correct personal protective equipment (PPE), individual safety equipment (ISE) and collective protective equipment (CPE) while complying with orders and instructions and behaving in a manner appropriate to the risks involved.
- **Leamer activities :**
 - Receive authorization for intervention
 - Take into account the work to be done
 - Decline the 63A socket replacement
 - Sign intervention authorization
 - Choosing the PPE, EIS and EPC required for the operation
 - Get to the site with the chosen equipment
 - Install EIS and EPC (beacon and insulating mat)
 - Fit PPE after checking its condition
 - Carry out the consignment steps
 - Performing VAT
 - Remove PPE
 - Replace the 32A socket
 - Re-equipping with PPE
 - Carrying out deconsignment
 - Test operation
 - Remove EIS and EPC
 - Sign the completion certificate



Sequence 2: Work on a 230V socket in a tertiary trunking and on 230V lighting.

- **Situation:** A building's operations manager is called by an employee who has noticed a fault in the lighting of a wall light and a loose contact on a 2P+T 230V (16A) socket. The operations manager asks for the luminaire connection device (DLC) to be changed, and for the 2P+T socket to be replaced by a new one.
- **Objectives:** To change the lighting connection device and replace the de-energized 2P+T socket using the correct personal protective equipment (PPE), individual safety equipment (ISE) and collective protective equipment (CPE), while complying with orders and instructions and behaving in a manner appropriate to the risks involved.
- **Leamer activities :**
 - Receive and sign intervention authorization
 - Choosing the PPE, EIS and EPC required for the operation
 - Getting to the site with the chosen equipment
 - Start CSD replacement
 - (same step as scenario 1)
 - Perform CSD replacement
 - (same step as scenario 1)
 - Testing CSD operation
 - (same step as scenario 1)
 - Start replacing the 2P+T socket
 - (same step as scenario 1)
 - Test 2P+T socket operation
 - (same step as scenario 1)
 - Sign the completion certificate



✓ **Reference:**

VS10-05-1 : Virtual training module: BS electrical empowerment (basic intervention supervisor) 2 sequences (industrial intervention on 400V socket box and tertiary intervention on 230V socket and lighting) - 1 license

Variants are available for several licenses for the same establishment or for rental - Please contact us for further information.



BR

Library of available scenarios

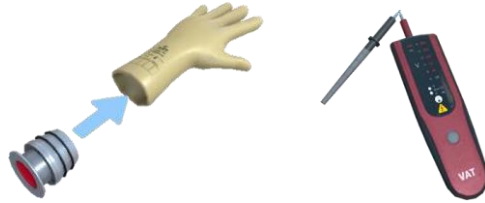
Module: Electrical accreditation for BR (general work supervisor) with work on Polyprod closing/ capping cell

✓ The main aim of this module is to replace a defective component after consignment on your own account, and to put the installation back into service if an adjustment task is required.

- **Situation:** The maintenance manager (B2V works manager) is called by the machine operator, who has noticed a malfunction. He has concluded that the motor circuit breaker in the plug distribution circuit is faulty. The general maintenance supervisor has to change this motor circuit breaker when it is de-energized.
- **Objectives:** Carry out the change of motor circuit breaker Q6 after having consigned the system, then put the installation back into service by ensuring the correct setting of this electrical component. These operations will be carried out using the correct personal protective equipment (PPE), individual safety equipment (ISE) and collective protective equipment (CPE), while complying with orders and instructions and behaving in a manner appropriate to the risks involved.

• **Leamer activities:**

- Receive and sign work order
- Choosing the PPE, EIS and EPC required for the operation
- Getting to the site with the chosen equipment
- Set up EPCs (beaconing)
- Carry out the consignment steps
- Fit PPE after checking its condition
- Open electrical cabinet
- Carrying out a no-voltage check (VAT)
- Remove PPE
- Replace motor circuit breaker Q6
- Setting the gauge
- Switch on circuit breaker ("on" position)
- Close electrical cabinet
- System deconsignation
- Restore power to the system
- Remove EPCs (marking)
- Test system operation
- Sign the completion certificate



✓ **References:**

VS10-06-1 : Virtual training module: Electrical empowerment for BR (general intervention supervisor) with intervention on Polyprod dosing/ capping cell - 1 license

Variants are available for several licenses for the same establishment - Please contact us for details.



Illustration of marker zone setup in the 3D scene



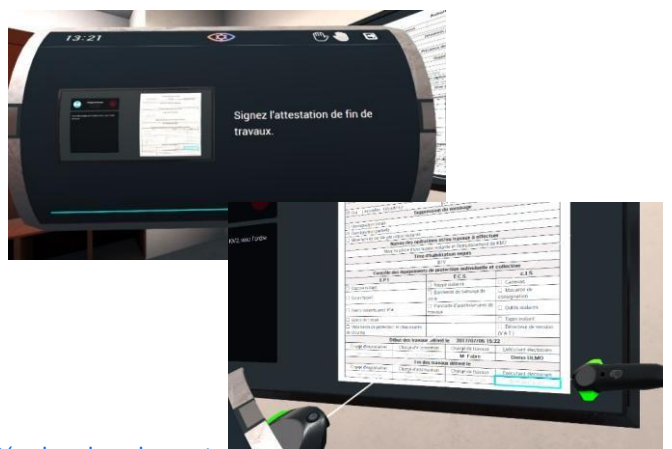
B2-BC

Library of available scenarios

Module: Electrical accreditation for B2-BC (work and consignment supervisor) with work on Polyprod dosing/ capping cell

- ✓ The main **objective** of this module is to **carry out consignment in one step, to ensure the direction of work entrusted to executants and to make carry out operations of electric orders except tension in simple neighborhood (zone 1) and to deconsign at the end of work.**
- **Situation:** The head of the maintenance department (B2V works manager) is called by the machine operator, who has noticed that communication between the machine and the man/machine dialogue console is being interrupted. He concluded that the fuse holder on the 24V power supply circuit was faulty. The person in charge of work and consignment must proceed with the consignment of the earthed equipment, have the work carried out by an electrician and proceed with the deconsignment of the system.
- **Objectives:** Carry out system consignment with earthing and short-circuiting, have the work carried out by an electrician and carry out system deconsignment using the correct personal protective equipment (PPE), individual safety equipment (ISE) and collective protective equipment (CPE), complying with orders and instructions and behaving in a manner appropriate to the risks involved.
- **Leamer activities in the 3D scene**

- Take information related to the breakdown
- Fill in the work order
- Plan electrical work
- Choosing the PPE, EIS and EPC required for the operation
- Getting to the site with the chosen equipment
- Set up EPCs (beaconing)
- Carry out the consignment steps
- Fit PPE after checking its condition
- Open electrical cabinet
- Carrying out a no-voltage check (VAT)
- Earthing and short-circuiting
- Close cabinet
- Remove PPE
- Involve the electrical contractor
- Check work completion against work order
- Choosing the PPE, EIS and EPC required for the operation
- Fit PPE after checking its condition
- Open cabinet door
- Remove grounding
- Close cabinet
- Remove PPE
- Uncouple the system
- Remove EIS and EPC
- Restart the system and ensure proper operation
- Sign the completion certificate



References:

VS10-07-1 : Virtual training module : Electrical empowerment for B2-BC (work and consignment supervisor) with intervention on Polyprod dosing/ capping cell - 1 license

Variants are available for multiple licenses for the same establishment or for rental - Please contact us for further information.



Safety-related equipment for electrical certification