



Virtual Indus "Maintenance"

Virtual reality training unit for industrial professions (production, maintenance, electrical engineering, energy, etc.).

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 **acquisition, consolidation and assessment of professional skills**.

Once the Virtual Indus training cell "**hardware environment**" (ref: V106 or V107) 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
BTS MS, FED, Electrotechnics
IUT GEII, GIM, GMP



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In partnership with



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



Highlights

- ✓ A **range 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.).
- ✓ **More 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)



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) Optimization of industrial designs: Anticipate and prepare for all process and product-related operations during the lifecycle: Virtual reality can be used to improve and validate mountability, 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
- ✓ Improving training quality through hands-on learning of skills and gestures
- ✓ Optimize investments (uptime), reduce technical floor space and labor costs



Complementarity of Virtual Reality & Serious Games

✓ Why Serious Games?

- Learning knowledge
- Discovering 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 rate: 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 using the virtual reality application creation and deployment software suite



Hardware environment

Equipment for the Virtual Indus training unit

Virtual reality headset:

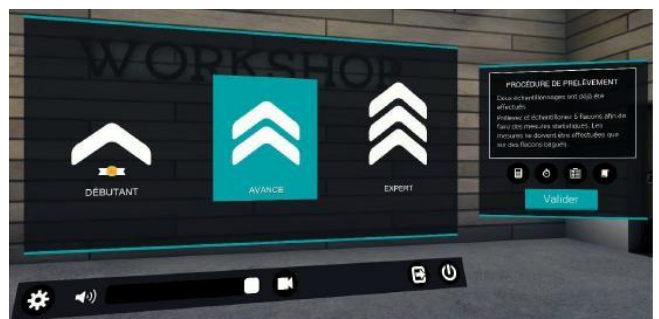
- ✓ HTC Vive virtual reality headset with a screen for each eye (1200 x 1080 px), an inertial measurement system (accelerometer, gyrometer) and position sensors to adjust the projected image.
- ✓ Wireless joysticks (x2) with inertial measurement system (accelerometer, gyrometer) and position sensors 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

General features of the "Virtual Indus Training Cell"

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 headset (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 to visualize results and progress in training (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). The 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.



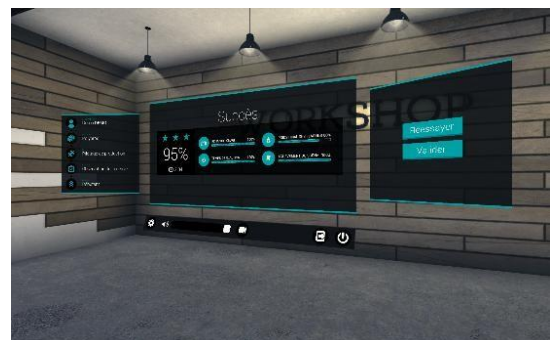
Vulcan environment features

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 can be integrated into existing ENT and LMS systems.





Virtual Indus "Maintenance

Virtual reality training unit for industrial professions (production, maintenance, Electrical engineering, Energetics...)

Video on



Virtual training module: Maintenance & diagnostics of Polyprod dosing/ capping cells

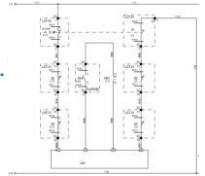
✓ The main objective of this module is to **carry out a diagnosis (corrective maintenance)**

SEQUENCE 1:

- **Situation:** The line pilot alerts the maintenance department and reports a malfunction. A problem has been reported on the Polyprod machine. The man/machine interface displays an alarm message: "MANQUE BOUCHON" (missing cork), while the operator reports that there are corks on the cork dispensing table.
As a BR-certified maintenance technician, you are asked to identify the problem.

SEQUENCE 2:

- **Situation:** A problem has been reported on the Polyprod machine. The alarm message: "EMERGENCY STOP" is displayed. The operator reports that he has not pressed the emergency stop button.
As a BR-certified maintenance technician, you are asked to identify the problem.



SEQUENCE 3:

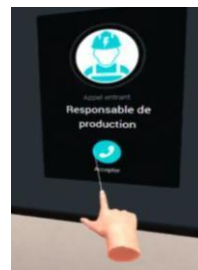
- **Situation:** A problem is reported on the Polyprod: when the machine is switched on, the HMI no longer lights up and the signal beacon remains off. Resetting is impossible. However, the dosing pump is visibly undervoltage, as are the operating part sensors. The I/O modules are also undervoltage but faulty.
As a BR-certified maintenance technician, you are asked to identify the problem.

Objectives:

Diagnose and identify defective components

Leamer activities:

- Get informed: "Gather all the information you need about the state of the system".
- Identify the faulty function
- Troubleshooting hypotheses: components likely to be faulty
- Locate test points and expected values: voltage measurements
- Identify activity-related risks
- Equipping and implementing E.P.I. - E.P.C. - E.I.S.
- Carry out tests, measurements and controls
- Interpreting results
- Identify defective components



POLYPROD		ERM	
E	MOD 2	MOD 3	
n	I1.3.0.0.0	I1.4.0.0.0	
r	I1.3.0.0.1	I1.4.0.0.1	
f	I1.3.0.0.2	I1.4.0.0.2	
r	I1.3.0.0.3	I1.4.0.0.3	
E	MOD 4	MOD 5	
n	I1.1.0.0.0	I1.2.0.0.0	
r	I1.1.0.0.1	I1.2.0.0.1	
f	I1.1.0.0.2	I1.2.0.0.2	
r	I1.1.0.0.3	I1.2.0.0.3	
E	MOD 6	MOD 7	
n	I1.5.0.0.0	I1.6.0.0.0	
r	I1.5.0.0.1	I1.6.0.0.1	
f	I1.5.0.0.2	I1.6.0.0.2	
r	I1.5.0.0.3	I1.6.0.0.3	

Reference:

VS010-03-1 : "Virtual Indus" virtual training module: Maintenance & Diagnostics of the Polyprod dosing/capping cell => Unit cost for one license
Variants are available for multiple licenses for the same establishment or for rental - Please contact us for further information.



Virtualized Polyprod packaging system