Virtual Indus " Production

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 **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

Sampling procedures

Statistical controls

Highlights

- ✓ A **range adapted** 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)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
- ✓ 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 with the virtual reality application creation and deployment software suite

Hardware environment

Equipment for the Virtual Indus training unit

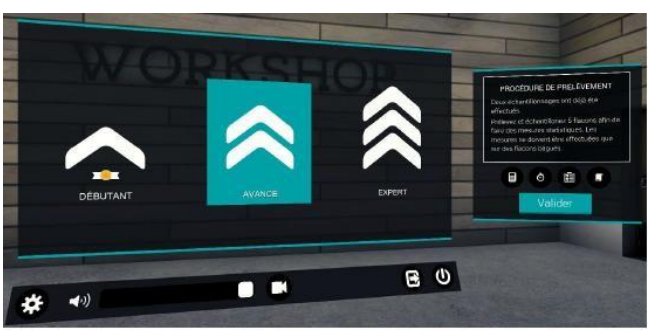
Virtual reality headset :

- ✓ 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 enable 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 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)
- ✓ Geolocalize 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 have been implemented, such as **activity guidance** with a **tablet connected to the handle**, sound message broadcasting, etc.

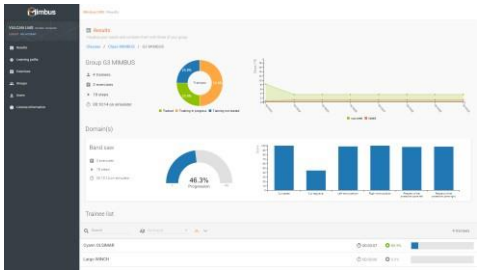
Vulcan environment features

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.



Virtual Indus " Production

Video on YouTube

Virtual training module: Production control of the Polyprod Statistical Process Control SPC1 dosing / capping cell (sampling procedure - drift observation - dosing machine adjustment)

✓ The main aim of this module is **to monitor production by analyzing indicators, production parameters and product specifications.**

✓ **Situation:** the packaging company has to produce bottles of liquid for a customer. The line pilot must ensure conformity of the order with customer specifications (quantity of product in the bottles).

✓ The training module consists of **3 sequences:**

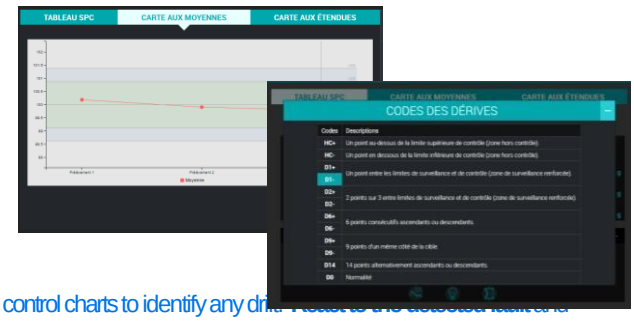
Virtualized Polyprod packaging system

Sequence 1: Sampling procedure

- **Aims: Carry out a sampling procedure to calculate the average and range** of products packaged on the production line, then interpret the results. This procedure uses control charts and graphical representations of results.
  - **Learner activities**
    - Identify vials to be sampled during production with rings
    - Record the mass of empty vials with the virtual communicating balance
    - Commission the Polyprod system and produce bottles with the contents
    - Pick up and weigh identified vials
    - Record gross weights on control charts
    - Calculate net mass, average and range
    - Save results (average and range maps)
    - Visualize results graphically

Sequence 2: Observing the drift

- **Objectives: Carry out statistical checks** during production. **Observe**, **qualify** and **anticipate** indicator results to **identify** production **drift.** This activity involves the use of control charts (monitoring limit, control limit, normality zone, reinforced monitoring and out-of-control) and the notion of drift.
  - **Learner activities :**
    - Take a sample using the **sampling procedure**
      The system records results on control charts
      and automatically deduces net mass, average and range.
    - Identify the sample on the chart (map with averages)
    - Determine your zone (normal, reinforced surveillance, out-of-control)
    - Coding the sample with the proposed drift table
    - Repeat the last three operations for the scope
    - Conclude and propose corrective action



Sequence 3: Setting the dosing unit

- **Objectives : Control the production line** by performing statistical checks on control charts to identify any dri[illegible] **decide to** adjust **the dosing pump settings** using the decision support chart. This activity uses control charts, drift and the decision support table.
  - **Learner activities**
    - Take a sample using the **sampling procedure**
    - **Observe** and code the **drift** or not
    - Use the decision-support chart to determine the action to be taken
    - Decide on the action to be taken (new dosing unit setting)
    - Calculate setting amplitude
    - Set the volume of liquid dosed at the man/machine console
    - Read and adjust metering pump setting
    - Take a new sample
    - Validate production (compliant products)

✓ **Reference :**
VS10-01-1 : Virtual training module: Production control of the Polyprod dosing/capping cell[illegible]s: Sampling procedure - Drift observation - Doser adjustment) - 1 license
Variants are available for several licenses for the same establishment or for rental - Please contact us for further information.

Library of available scenarios

Video on YouTube

Virtual training module: Production control of the Polyprod Statistical Process Control SPC2 dosing / capping cell (Filling machine qualification - Control by card control)

- ✓ The main aim of this module is to **control a production line using control cards.**
- ✓ **Situation:** the packaging company produces liquid vials for a customer. The line pilot must ensure conformity of the customer's order in relation to the customer's specifications (quantity of product in the bottles).
- ✓ The training module consists of **2 sequences**

Virtualized Polyprod packaging system

Sequence 1: Dosing machine qualification

- **Objectives: Carry out statistical controls** by sampling in order to monitor significant control indicators, machine and product parameters. **Optimize** and **qualify settings** and **validate production**. This procedure implements control charts (monitoring limit, control limit, normality zone, reinforced monitoring and out-of-control), graphic representations and drifts.
- **Learner activities**
  - Carry out sampling according to procedure
  - Identify the sample on the aux averages card
  - Determine the sampling zone
  - Coding the sample with the drift table
  - Repeat the operation for the full extent.
  - Propose and implement corrective action
  - Renew the activity to qualify the metering pump

Sequence 2: Control by control board

- **Objectives : Pilot the production line with control charts**. Adjust production parameters and **correct** drifts. This activity uses control charts and the notion of defect.
- **Learner activities :**
  - Taking a sample
  - Analyze results with control charts
  - Pre-diagnose the source of the fault
  - Estimating the impact on production
  - Remedy the hazard by proposing corrective action
  - Continue to manage the production line

✓ **Reference :**

VS10-02-1 : Virtual training module : Production control of the Polyprod dosing/capping cell => Statistical Process Control SPC2 (2 teaching sequences : Filling machine qualification - Control card control) - 1 license

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

Virtualized Polyprod packaging system