



3D-Trainer

Skills development and safety awareness for manufacturers



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3D Trainer - The Rationale

Most manufacturers will agree that a skilled workforce is vitally important to success - especially when competing in the harsh reality of the global economy .

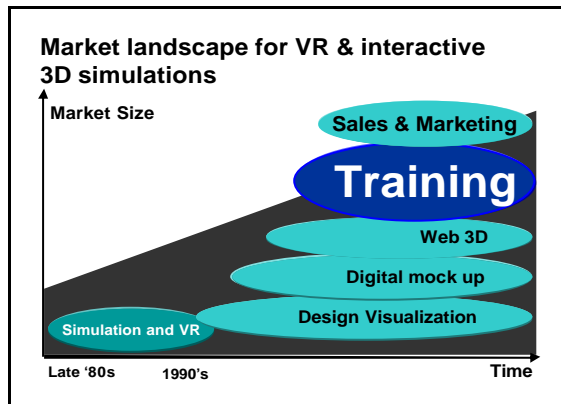
However, in an increasingly complex manufacturing environment, quality training can be difficult. Time constraints, risk of damage to machinery and injury are dynamics that have to be contended with.



From simple to complex - 3D Trainer can simulate it

3D-Trainer helps to remove these risks and constraints- any environment can be created - from a simple component to an entire factory- on the desktop PC.

3D-Trainer has developed out of Virtual Reality (VR) - and allows us to simulate real world environments - tailored with as much detail and as much realistic interactivity as is needed.



VR or "interactive visual simulation"- "a computer-generated environment where the user is able to view and manipulate the contents of the environment- in real-time".

3D-Trainer also leads to cost savings. It is estimated that computer-based training can be as much as 50% cheaper than traditional instructor led training¹.

the Naledi3d Factory - " One of South Africa's most innovative companies" (Business Day - Dec. 2003)

¹ Hall, B. 1997. Return on investment: ROI and multimedia training

3D-Trainer, being visual in nature, provides an enhanced learning experience - in 40% to 60% less time than other instructor-led training.

Most people are familiar with the dynamic simulations that are routinely used by airline pilots. We can also bring a similar level of immersion to industrial training with **3D Trainer** - training which ensures that operators develop a *confidence* and *competence* in their ability to handle normal and abnormal workplace situations. Once operators can achieve this, unplanned shutdowns and their consequences may also be reduced.

3D-Trainer models can be used individually, or in group sessions where a facilitator uses a data-projector to project the material to a larger screen and uses the material to engage with the audience.



What does this mean for SA manufacturers?

The principles underlying **3D-Trainer** are founded on a new understanding of how people learn:

Language - most formal training in Africa is done in English, is often a person's third or fourth strongest language. The learner is disadvantaged from day one.

Literacy - which is a serious barrier to learning in developing areas of the world, including Africa where literacy averages around 56%.

Text - which is used as the main medium for knowledge transfer is very inefficient. Our brain is essentially a visual organ that responds best to visual stimuli - *we dream in pictures - we "see" what other people tell us!*

3D-Trainer is not only **visual**, but also **interactive**, which makes it even more compatible with how the brain actually learns - we learn by making mistakes!

What does all this mean? 3D-Trainer can have a larger skills impact in Africa than Europe and the US, where literacy and language are not major barriers to learning.

In other words, **3D Trainer** is well suited to the training needs and challenges of South African (and African) manufacturers and service companies!



In our **3D-Trainer** systems, we use VR to give a global picture, an overview, but sometimes we also use text to add detail. However, VR remains a powerful way of transferring knowledge - *effectively, efficiently and in a way that engages the learner*

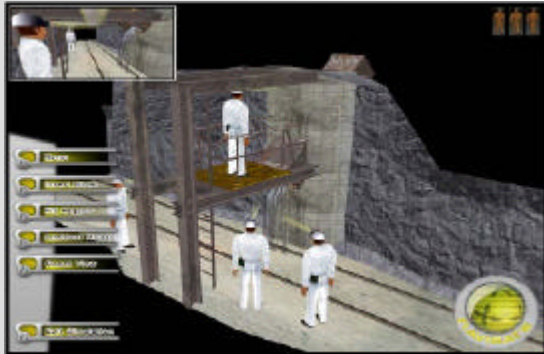
3D-Trainer - Some examples...

The best way to explain 3D Trainer is to look in more detail at two of our previous training systems.

AngloGold Ashanti Mud-rush simulator

Mines, and especially gold mines (deeper working depths), are hazardous working environments. Consequently, large resources are put into safety awareness and training. This VR model teaches a correct safety procedure as well as, importantly, the consequences of non-compliance.

The simulation consists of a chute, rail line, and work platform (safety area) and teaches workers the importance of staying well clear of the chute. It also demonstrates to the operator of the stope chute that he is safer on the structure platform - instead of jumping off should a mud rush occur.



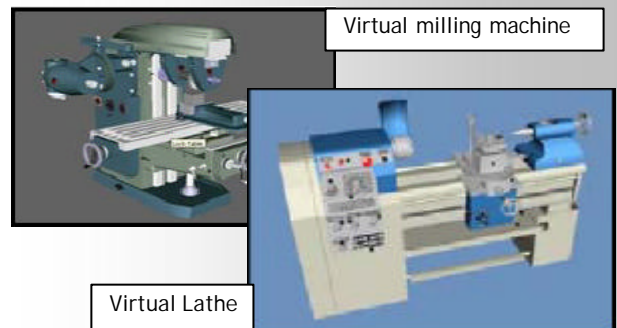
The user, or facilitator is able to 'drag-and-drop' a number of workers into the scene – and set up any potential scenario. One miner has to be located on the platform. One of five levels of accident severity can be selected. When the mudrush occurs, the affected miners change colour – red (fatal); yellow (injured); and green (safe). A portal can also be activated to see a selected miner's view of the scene. Audio is also used to add an element of realism, both as background mine sounds as well as when an incident occurs.



Department of labour & National Skills Fund Lathe and Milling Machine Simulator

SA is under-resourced in good tool-making skills, especially with an expanding economy. The use of VR in technical skills development offers tremendous potential in address the needs of the manufacturing sector. The simulator allows the user to get a realistic hands-on exposure to the machines without risking injury or equipment damage.

VR simulations, blended with other multimedia provide a rich and rewarding learning experience, allowing the student to practice machining procedures and understand the main principles of milling and turning. The virtual machines are true to life and give feedback when mistakes are made. A self-assessment section tests the learning gained, which also include safety and trouble-shooting.



The user can fit a work-piece, take measurements and do basic machining. The ability to zoom in, rotate and walk around the machine makes this learning experience particularly engaging.

SAQA Unit Standards were used as a basis so as to conform to national standards. The learning covered includes: basic use of the machine; health and safety issues; tolerance and measurement; definitions and terminologies; tips and tricks; links to other resources. The learning content was structured to include: an introduction (aims and objectives, finding help, structure, navigation, etc); background; basics; operations; tasks; a self-assessment system and a reference section



A Global Business Case - What do others say

3D-Trainer is a concept that is in many ways new to the South African (and African) training landscape.

However, similar concepts have been applied in the US and Europe for some time now. Two examples, while they do apply to much larger VR training systems do give an indication of the potential that can be gained from **3D-Trainer**:

USA - South Carolina Electric & Gas

Not too long ago South Carolina Electric & Gas's (SCE&G) management faced bringing a new generating station on-line, with boiler design (and control strategies) new to SCE&G, using new operators.

According to SCE&G simulation manager Glenn Westberry, *"Management's decision to install a high fidelity, dynamic operator simulation unit early in the project's life has paid countless dividends. Using the simulator, we identified several logic problems in the control configuration that would have caused unexpected unit trips during startup. Since startup we regularly use the simulator to conduct normal and abnormal operational training exercises for operators, and we have found it to be the best place for engineers, technicians, and operators to work out 'what-if' improvement scenarios without jeopardizing on-line operations. Our operators and technicians are always asking when they can get more simulator time."*

USA - Phillips 66

When Phillips 66 decided to build its first Methyl Mercaptan (the "stink" added to natural gas so you can smell a leak) production facility, a training simulator was included as part of the project. The investment paid big dividends. A startup, predicted to take 200 to 350 hours, was completed in just 66 hours.

Because of the accuracy of the simulation, extended operator simulator time, and many successful simulator startups, the operators learned which areas of the process required special attention as startup progressed. Without all the simulator hours and the confidence and competence they create, the startup would have taken much longer and have been more difficult.

As one trainee said, *"There were times when the simulator was so close to the real plant, I forgot I was running a simulation."*

Putting it all Together

3D-Trainer is a new, powerful tool to develop our industrial and manufacturing skills base.

It can be used to great effect in:

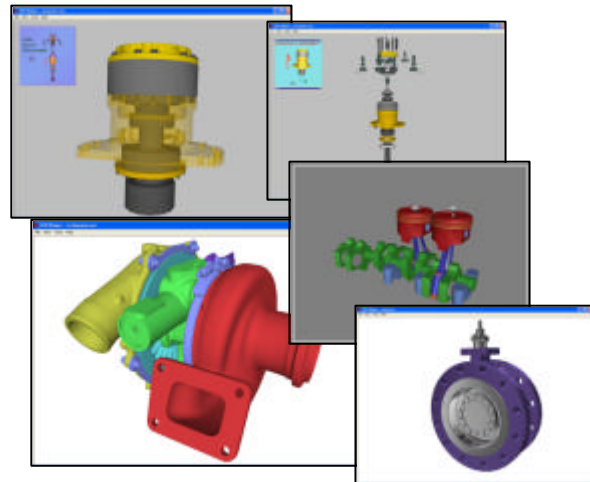
- ABET training;
- Skills development;
- Safety training.

3D-Trainer is visual in nature and therefore:

- Overcomes language barriers;
- Overcomes literacy barriers;
- Leads to greater understanding;
- Leads to both greater as well as longer retention of the learning.

Let us work together to define how **3D-Trainer** can help your company make your training initiatives:

- More effective;
- More cost effective;
- Result in greater learning retention;
- Improve productivity;
- Result in less down-time;
- Broaden multi-skilling;
- Enhance safety awareness.



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