



VIRTUAL REALITY FOR SAFETY HAZARDS

For L&T Power – a case study

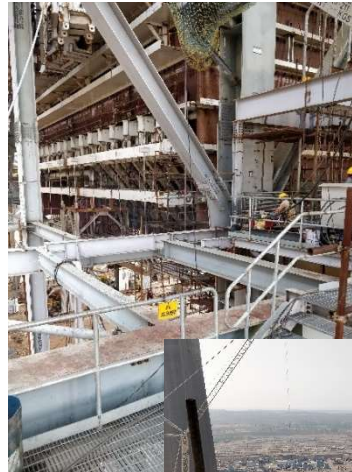
Abstract

**Sensitizing Workers to Safety Hazards & Reinforcing Importance
of following SOPs using Immersive Virtual Reality**

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THE CHALLENGE / USE CASE:

- a) The client, constructing a thermal power plant, employs a large number of skilled labourers who work in **high-risk, high-hazard environments**
- b) Client has found that many workers developed a **casual attitude** to risks & hazards after working for a while, exemplified by statements such as *“Following the protocols is tiresome & cumbersome. It takes time, the equipment is heavy & uncomfortable, and given my experience, I do not really need them. I’m careful”*
- c) Often, workers **do not use the PPE** such as harnesses, life-lines, etc. **appropriately** due of inaccurate assessment of the situation or poor appreciation of the risk probabilities involved



THE NEED : SENSITIZE WORKERS TO HAZARDS & INCIDENTS THAT CAN OCCUR DUE TO NEGLIGENCE

THE SOLUTION:

A multi-lingual, immersive 360° virtual reality re-creation of the incidents that can occur when PPEs are not used appropriately, or when SOPs are not followed.

OUR RATIONALE:

- a) Significant academic & operational research has demonstrated that people, in general, are notoriously poor at assessing risk
- b) Therefore, we needed an approach that would shake people out of their sense of complacency & make the risk more “personal” & “real”



WHY VIRTUAL REALITY:

- a) 360° Virtual Reality is amongst the most effective ways of driving immersion & impact
- b) A clear instance of **“you must see it to believe it”**, it is the best substitute to actually re-creating the experience in reality
- c) cost effective & scalable

We would like to thank L&T Power for permission to use their images in this case study

THE TRAINING OBJECTIVES:

- **Highlight & reinforce** the critical idea that accidents can happen to anyone, and their consequences are likely severe and / or fatal
- **Make it personal:** ‘experiencing’ the accident may be the best way to focus their attention on the risks of not following safety protocols
- Reinforce the idea that the best way to prevent accidents is to follow safety protocols
- Ensure that the rationale behind SOPs is understood by workers, helping **increase adherence**

TRAINEE PROFILE:

- 7th pass & above
- Highly skilled, but perhaps functionally illiterate → this dictates design decisions on communication formats & text use, etc.
- Limited exposure to smartphones or new technology → this drives our user-interface design

EXTENSIVE COLLABORATION WITH & SUPPORT FROM CLIENT EHS & DIGITAL TEAMS WAS CRITICAL FOR SUCCESS

OUR APPROACH:

Planning & observation phase:

- a. We worked with the client team to identify key hazards & behaviours they wanted to target
- b. We visited the site location to:
 - i. Understand the actual site conditions, where we needed to shoot & recreate
 - ii. Interact with workers & site officers to better understand the end users (i.e., the workers)
 - iii. Understand the deployment conditions & challenges that our solution would need to address



What we learnt:

- Workers had limited technology exposure or savvy
- Limited time: EHS / HSEE staff in a high-tech power plant construction site have extremely limited time.
- Limited IT resources: Given the power plant site's remote location, connectivity & IT related infrastructure was limited.

What it meant for our solution:

- Our solutions had to be designed to be extremely intuitive, and require limited to no user input
- Our solution had to be “hands-free” & “plug & play”
- Our solutions had to be deployed in a fashion that minimized local IT support requirements & overhead

Design phase

- We designed the training modules to **simulate actual falls, explosions, etc.** to sensitize the end users
- Considering the unfamiliar technology, user orientation was critical & explicitly incorporated in the modules
- Further, we wanted to minimize text-based interfaces, to ensure literacy / reading was not a barrier
- Therefore, an experienced theatre actor acted as the “safety officer”, orienting them to the module & highlighting the correct safety protocols



Development phase:

- We used a mix of **story-telling & recreation** to explain potential consequences of ignoring SOPs
- By focusing on scenarios where the rules were not followed and then playing out the consequences, we **established a connect between the procedure & its reason**
- We used a **shoot-based approach** where our team was **on the client's site for 12 days** with a professional actor

Deployment:

- To ensure immersivity, a high quality cost-effective VR headset was chosen by the client
- We developed custom applications for the Oculus Go headset which did not require any use of the controller, etc. once the device was started
- Though the scope called for only one application, based on deployment feedback, we developed 2 additional application solutions to support on-ground deployment



While accurate assessment of impact requires a long-term, detailed statistical study, preliminary assessment from the safety team at the site suggests that **using such virtual reality based approaches leave a significant, lingering impact on the workers re the importance of following safety protocols**