LRMGDIGITAL

Using virtual reality to improve safety while working at heights

Performance Architects

With LMRG's help, **ArcelorMittal South Africa** is using cutting edge technology to improve safety while working at heights, and enhancing employees' work experience.

The client's struggle for progress

Thousands of people work daily in ArcelorMittal South Africa's massive plants, which contain high structures and dangerous equipment. In heavy industrial environments like these, safety is a prime consideration but something that is not easy to achieve.

To be effective, safety training has to be ingrained in the way employees do their work, day after day. Getting safety training right is thus a matter of life and death, and the company has a deep commitment to zero fatalities in the workplace.

A particular safety training problem was preparing employees to work at heights. The training process takes three days, and uses a combination of classroom based teaching and practical exercises. However, for obvious safety reasons, the practical training has to be done at ground level.

The problem here is that the work is actually done hundreds of metres above ground; for example, maintaining a cooling tower. Only once the employees had received the expensive and time consuming safety training were they able to experience the actual working conditions they would have to face. Given that fear of heights is very common, a large proportion of trainees (approximately 65 percent) found that they simply could not work in those conditions.

In other words, the training and effort was wasted. Given that it cost around R300 000 to train one apprentice over a two year period, the financial loss was considerable; to this must be added the human cost when employees are forced to confront the fact that they cannot do what they thought they could, and must rethink their entire career trajectory.

LRMG's solution

That's when LRMG came on board with a novel suggestion: why not use virtual reality to deliver the requisite training to be delivered safely, but within a wholly convincing simulation of the actual working conditions.

"Height training seemed to offer a clear use case for virtual reality, and we had heard of it being used for something similar in China, so we knew the concept worked," says Leigh Kandier, the LRMG Project Lead who helped formulate the solution. "After we had done a rudimentary proof of concept, ArcelorMittal South Africa had the foresight to see what could be achieved, and gave us the green light to develop a customised virtual training module for them."

LRMG then enlisted the expert help of trusted VR partner, a leading South African virtual reality developer, to help create the final product.

The result is a virtual reality experience that uses a gaming format to show an individual what the working conditions will be like, and test whether he or she is able to function within them. With an HTC Vive virtual reality headset fitted, and using handheld controls, the trainee has to unlock a lift by retrieving a key from a locked box, enter the lift and ascend to a great height. On exiting onto a platform high above the ground, the trainee to perform various operational challenges including stepping out onto a plank that juts out into space, and put a blue hammer into a red box.

The latter exercise tests for colour blindness – it's vital that the individual can identify colours when repairing or checking wiring several stories up in the air. 4D elements add to the experience – the platform shakes while in the virtual elevator and fans simulate windy conditions.

The system also monitors the user's heart rate levels throughout the exercise. This gives insight into the levels of stress a person is experiencing working in these conditions and provides another indicator as to the person's affinity to working at heights. A person may be able to complete the tasks, however, the prolonged stress of doing so if not able to cope physiologically under these conditions could have a negative impact on their long term health. They can then be taught to manage these stress levels, or alternatively, look at another career within ArcelorMittal South Africa.

Everyone who completes the module testifies how realistic it is, how convincing the experience of standing on a narrow platform above the void is. It thus truly allows people to assess whether they can function at great heights, and indeed whether they wish to undertake this kind of work.

Business benefits

The efficacy of the new technology was apparent from Day One. Thirty to 40 candidates can utilise the platform in a day. During the first day, three unsuitable candidates were already eliminated from the training.

"We had recouped the cost of the virtual reality programme by the end of the first day," says Gerda Fourie, Learning Experience Design Specialist at ArcelorMittal South Africa says. "That's an unbelievable return on investment."

She goes on to say that the benefits from the programme go beyond the financial. It also provides employees with a great way to establish early on whether a certain career path is right for them.

"We knew the concept worked"

Leigh Kandier

The virtual reality module is also a source of great data about how this type of environment affects individuals. Insights provided by data analysis would prompt the company to schedule medical or other interventions as needed to help the employee manage the ongoing stresses of working at height.

LRMG is currently working on expanding the working-at-height module to include more safety training, with plans to roll out the programme to more plants within the ArcelorMittal Group internationally.

Perhaps even more exciting, this module has shown that virtual reality can be used more widely in the blue-collar environment, particularly in areas where practical training would risk either individuals or equipment. Examples might range from simulating what it is like working in a confined space to coaching an apprentice on how to repair a piece of equipment. Using virtual reality also overcomes the training challenges posed by differing literacy levels and language.

"It was immediately clear that this technology was made for this application – and experience bears this out," concludes Fourie. "But it's also opening up new vistas for how we can use it in our typical manufacturing environment to overcome other challenges, and greatly improve the working experience of our employees."

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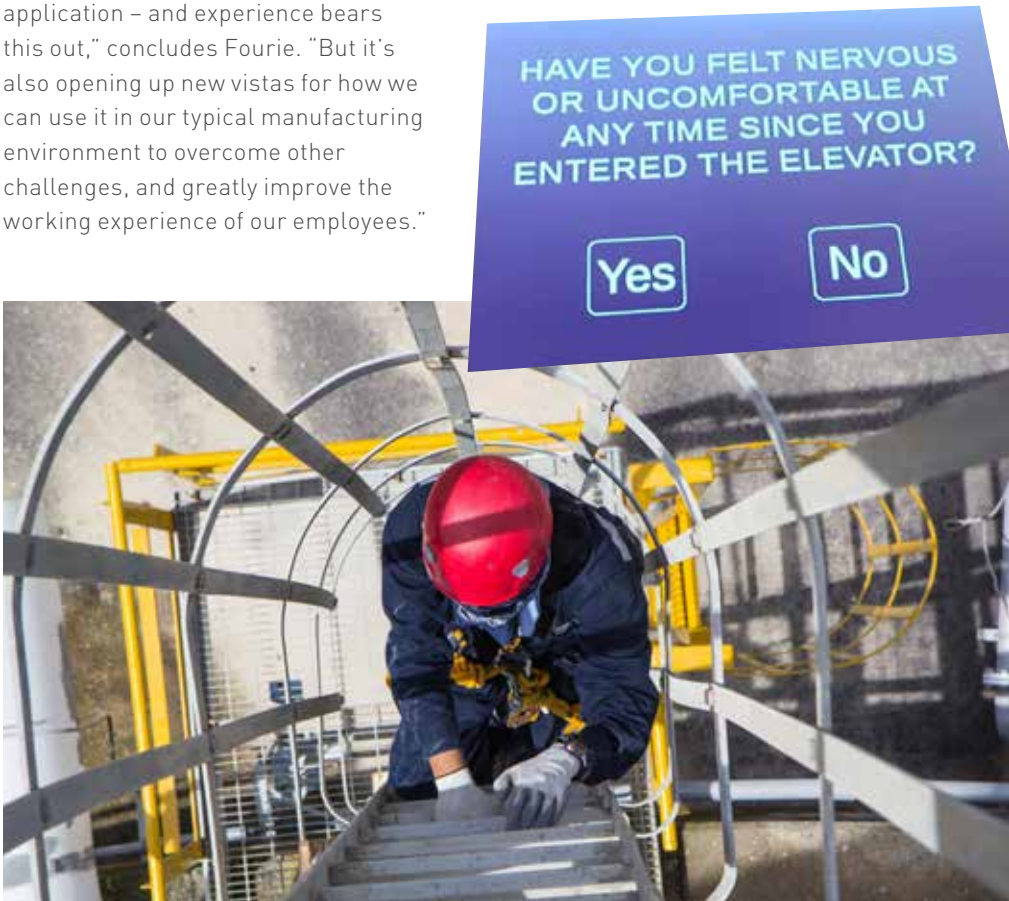
Gerda Fourie

About ArcelorMittal South Africa

ArcelorMittal South Africa is the largest steel producer in Africa. As at June 2018, the company supplied 68% of the steel used in South Africa, while exporting around one million tonnes per annum to sub Saharan Africa and elsewhere. The company was founded in 1928, and is part of the ArcelorMittal Group, the world's largest steel producer. It employs over 9 000 people and has its headquarters and a major manufacturing facility at Vanderbijlpark. Other works are located at Vereeniging, Pretoria, Newcastle and Saldanha Bay.



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About LRMG

LRMG aligns people and environments to optimal performance through a unique understanding of the connected mechanisms and contexts that drive positive people and organisational outcomes. It has been delivering performance solutions that result in a measurable impact since 1997, and its solutions continue to evolve to address the skills and capabilities its clients will need tomorrow. LRMG has offices in Johannesburg, Cape Town, Kenya and Mauritius and representation in another 18 African territories.

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