PRACTON
GROUP PTY LTD

Case Study - Spectra Mission

Lunar mission testing of Virtual Reality training for hostile, high risk environments

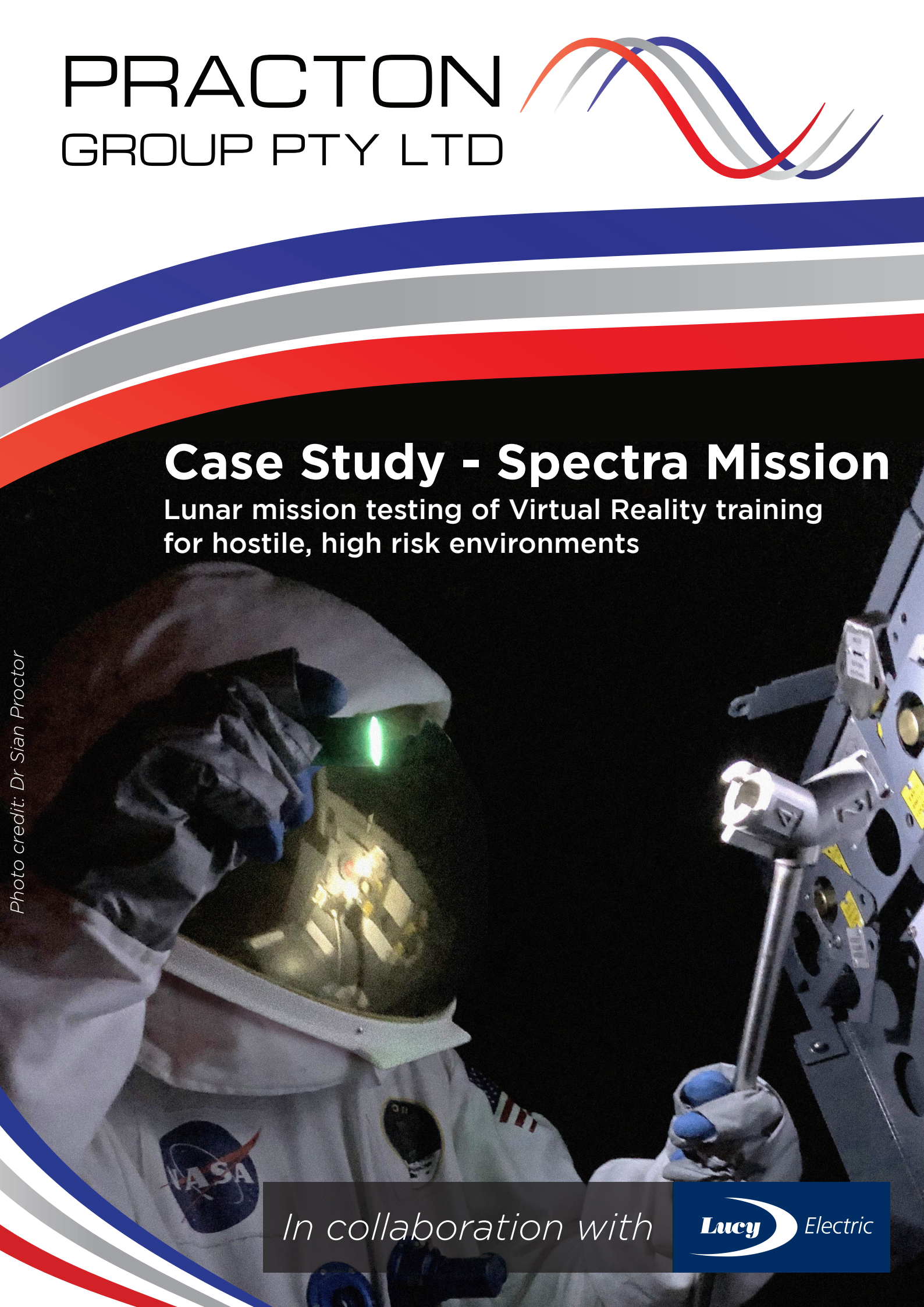


Photo credit: Dr Sian Proctor

In collaboration with Lucy Electric

Introduction

Training technicians to maintain electrical equipment located in hostile, high risk environments is a major challenge. How do companies provide effective training without exposing employees to unnecessary risks? One option is immersive Virtual Reality (VR) platforms. These can offer simulated sessions which give engineers the training they need in a safe, risk-free environment. But how can companies know more about whether VR provides effective training for vital, safety-critical equipment?

In July 2018, Practon Group and Lucy Electric had the opportunity to test the benefits of VR training in an 'out of this world' environment. The two companies participated in the SPECTRA Mission, a simulated lunar space mission.

A crew of six international analogue astronauts (Team SPECTRA) completed a unique two-week lunar analogue mission at the LunAres research station in Pila, Poland. As part of the mission the multi-disciplinary team carried out more than 40 research projects to support new and cutting edge activities between future Earth-Moon teams, including testing VR training scenarios.

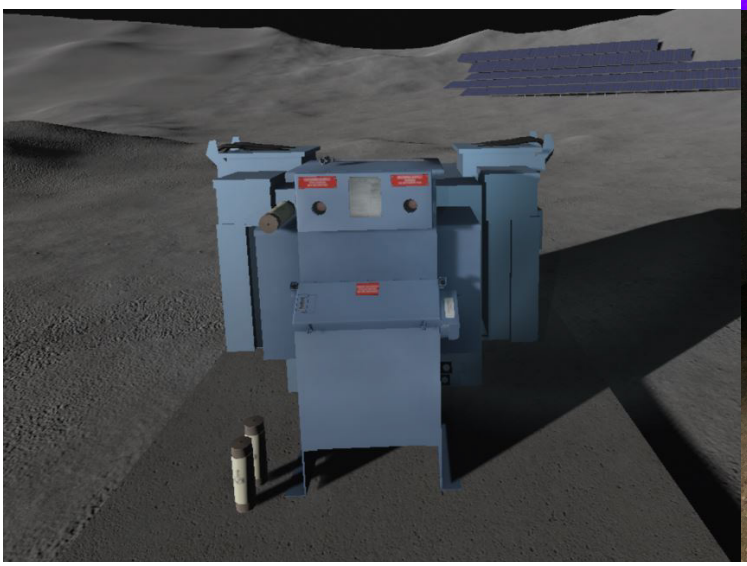
The LunAres facility is a privately-funded centre for training astronauts, testing hardware and conducting research. The station consists of an isolated independent habitat that houses eight confined modules for living and working in simulated space conditions plus an airlock to simulate decompression prior to extravehicular activities or space walks.

The Challenge

The Practon Group and Lucy Electric created a project to test the viability of VR training for complex tasks in hazardous, stressful environments.

The project investigated the addition of VR (dynamic 3D graphics) to standard (2D static text and graphic) teaching tools and their effectiveness during a simulated emergency during the lunar mission. This required the crew to complete fault identification and resolution on a Lucy Electric Trident Fused Ring Main Unit (RMU) – the primary (simulated) power feeder for the LunAres lunar habitat – under time tagged constraints.

All this was completed in the hazardous environment of the simulated lunar surface.



The Project

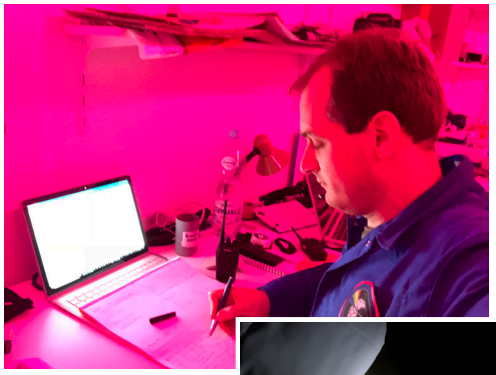
Firstly, an immersive virtual reality training model was built for the Lucy Electric Trident Fused RMU using the Practon VR platform developed in partnership with Sentient Computing. A step-by-step sequence was developed to allow the crew to learn the various maintenance and fault resolution procedures for the unit. The module simulated Moon-like gravity and lighting to create realistic environmental conditions on the lunar surface.

At the beginning of the mission the crew were given a traditional training presentation and a review of the operational manual for the Lucy Trident Fused RMU, to create a baseline of knowledge. One of the teams were also given the opportunity to undertake a series of training scenarios using the VR training simulation on the Practon VR platform.

Approximately one week later, the team's knowledge was put to the test when a fault was simulated on the network which resulted in the loss of primary power and lighting to the lunar habitat. Back-up power and lighting were only available to the habitat for a limited amount of time. The fault was traced and resolved, and to restore power the team needed to reconnect the Trident Fused RMU which required an Extra-Vehicular Activity (EVA) – that is, for a team to leave the habitat to resolve the issue in situ.

For the activity the crew were organised into three teams:

- Team One were tasked with co-ordinating the experiment from within the habitat
- Team Two were required to EVA and reconnect the physical RMU using their standard training
- Team Three were required to EVA and reconnect the physical RMU using their standard and additional VR training



The teams were video recorded during their EVA to review the experiment and help assess the effectiveness of the two teams following the different training methodologies.

Outcomes

Better Training

The benefits of the virtual reality training were clear. Team Three, which undertook the simulation training, were able to complete the task considerably faster than Team Two, which relied on only standard methods of training.

Immersive VR training delivers kinematic learning, "learning by doing", which has previously been demonstrated to significantly improve the long-term retention of skills and information. Trainees are more engaged with the task, learn more quickly and are able to remember more of what they have learnt for longer. It also creates a familiarity with the physical task so that trainees become accustomed to the equipment they are working on and the procedural requirements of the task, before completing actions in reality.

As such, VR-trained team members reported feeling much more confident about tackling the task and were able to complete it more quickly, without reference back to training materials.

Cost Savings

The reduced task completion time also delivers cost benefits. Higher fidelity training delivers faster fault resolution, which translates to less employee time spent on unscheduled/emergency servicing, and less down time for the power supply and mission critical equipment.

"The training was really great because it gave me the confidence to be able to go out and perform the tasks. – I felt a lot more prepared, and that I could complete the tasks without the manual"

Dr Sian Proctor,
Geoscientist,
Lunares III Mission

"The VR training was extremely effective. I retained most of the knowledge and felt very energetic after it."

Omar Samra,
Vice Commander,
Lunares III Mission

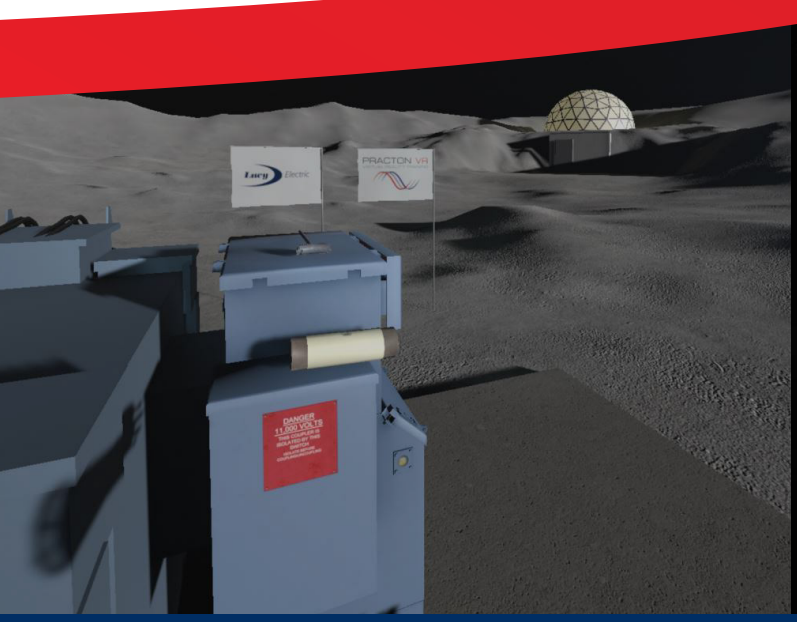
Safe and Risk-Free Environment

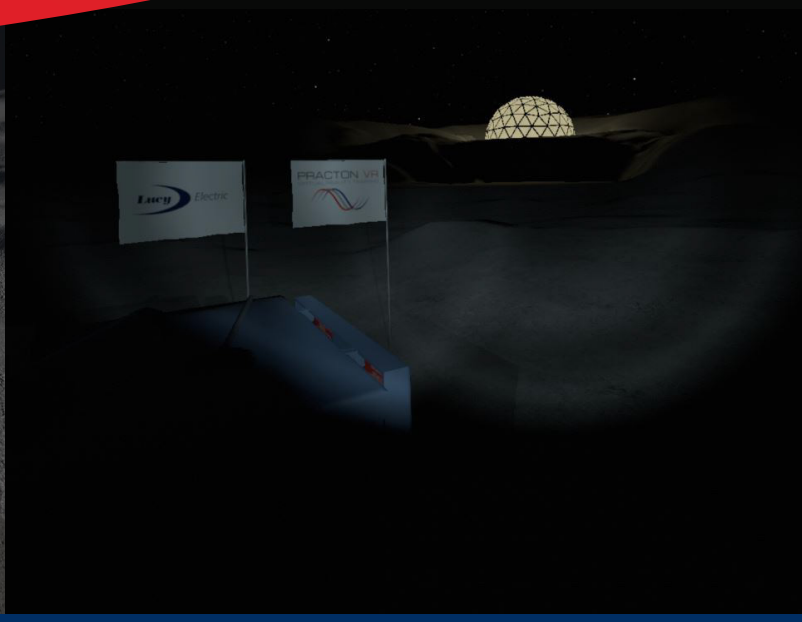
VR training also has invaluable safety benefits. Employees are trained and can practice in a "safe to fail" environment. There is zero risk to individuals from exposure to hazards such as live high voltage or arc flash, and no risk of damaging valuable and vital electrical infrastructure.

This allows trainees to experiment, fail safely and try again until their competency has been verified and they can more safely move on to live equipment.

PRACTON VR

VIRTUAL REALITY TRAINING





About Practon Group

Practon Group is an electrical contractor with extensive experience working in the Australian mining industry.

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About Lucy Electric

Lucy Electric is a global leader in switching, protection and automation solutions for electrical distribution systems.

Lucy Electric

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