

VEOLIA REMOTE SWITCHING FINGER

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ABSTRACT

Veolia's remote-switching finger is an innovative solution to reduce the risk of life-changing injury or death through exposure to an arc flash. Conducting high-voltage or low-voltage switching while standing in front of switchgear puts workers at risk if an arc flash occurs while switching. Until recently, this risk has largely been controlled through PPE. Veolia's Hunter operations thought we could do better. They developed the remote switching finger, an inexpensive, portable and easy-to-use safety tool with potentially life-saving impacts. The switching finger attaches to the front of a wide variety of switchgear using high-powered magnets. The finger is attached to a remote control by a long cable that allows workers to move many metres from the switchgear, outside of the impact zone of an arc flash. When the worker presses the button on the control unit, an extendable metal finger acts like a human finger to open or close the circuit breaker.

1.0 INTRODUCTION

The remote switching finger was the brainchild of Veolia's Hunter region electrical maintenance supervisor, Aaron Burke. Aaron investigated commercially available solutions and found that they did not meet his needs, as they were not flexible enough to use across the multiple makes and models of switchgear within Veolia's Hunter operations. Using readily available equipment from his local hardware store and electrical supplier, Aaron was able to develop a prototype (Figure 1) that was easy to operate, cheap to manufacture and could be applied to a variety of switchgear makes and models. Aaron's prototype was trialled on various models of air circuit breakers and high voltage circuit breakers across Veolia's Australian operations and was gradually improved based on feedback from different local teams. For example, the latest version of the finger will automatically retract when the operator's finger is lifted from the remote. This will prevent the finger from accidentally being installed in the extended position.



Figure 1

<https://www.youtube.com/watch?v=riMiRb9qBs8>

2.0 DISCUSSION

An arc flash is a release of electrical energy that causes an explosion that can reach

temperatures of up to 20,000 degrees Celsius (Figure 2).

An arc flash usually occurs in large switchboards but can also occur in smaller switchboards, electricity supply pillars or large electrical equipment.

Arc flash can cause serious injury or death. Injuries can include:

- burns;
- broken bones;
- concussion;
- hearing loss.



Figure 2

Switching in front of air circuit breakers/ high voltage circuit breakers puts workers at risk of exposure to an arc flash, an explosive release of energy that can involve temperatures greater than 20,000 degrees Celsius. Consequences can include third-degree burns, blindness, hearing loss, nerve damage, cardiac arrest and potential death. There are several mechanisms that may cause an arc flash, but switching is one mechanism that presents a risk of arc flash and that traditionally involves workers standing directly in front of the switchgear. Moving the worker outside of the arc flash zone during switching takes them out of the line of fire and eliminates the risk of harm should an arc flash event occur.

Veolia has identified electrical hazards as being among its highest-risk safety hazards for workers, with the potential to cause life-altering injury or death. Following some high-potential near misses and incidents relating to electrical safety, Veolia embarked on an electrical safety roadmap for its water business to reduce the risk of working with electricity to its workers.

Switching is known to be one potential trigger of an arc flash, an uncontrolled release of energy causing temperatures of up to 20,000C. Although some modern switchgear is available with in-built options for remote switching, many of the existing installations that Veolia operates do not have this functionality. This leaves workers with a significant dependence on PPE, which is at the bottom of the hierarchy of controls. The development of the remote switching finger has allowed Veolia to make remote switching available to many water sites where workers previously switched in front of HV and LV switchboards. The roll-out of this solution is ongoing, with an ambition to make some form of remote switching available to all Veolia Water sites in Australia. This significantly reduces the risk of an arc flash injury to Veolia's electrical workers (Figure 3).



Figure 3

3.0 CONCLUSION

The remote switching finger is an inexpensive, portable and easy-to-use safety tool with potentially life-saving impacts. The switching finger attaches to the front of high-voltage and low-voltage air circuit breakers to allow workers to safely operate electrical switchgear outside of the impact zone of any potential arc flash.

This tool eliminates the need to wear cumbersome, hot large bomb-proof style suits (Figure 4), thus following the hierarchy of controls of elimination instead of PPE.



Figure 4

4.0 ACKNOWLEDGEMENTS

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