

Fires, Explosions and Faults

Improving Machine & Electrical Safety in Mining & Manufacturing





Electricity in the Industrial Workplace:

The use of heavy machinery and electrical equipment is unavoidable for many working within Australia's mining and manufacturing industries. While these technologies bring many efficiency advantages, they are also the largest cost that mining and manufacturing business encounter, as well as the main source of risk towards employee safety.

Between 2003 and 2011, a total of 117 worker fatalities occurred as a direct result of contact with electricity [1]; in South Australia, 53% of all reported electrical injuries and deaths took place while at work, with 20% of these recorded as taking place at 'industrial locations'[2].

For this reason, it is crucial that organisations employ comprehensive maintenance and monitoring strategies to protect both employees and maintain important machinery and technology.



“In the last 12 years, over 36,000 work days were lost due to mine-site electrical injuries.”



Protecting Workers:

Despite improved safety training, design and technology (such as residual current devices or RCDs), work-related injury and fatality rates remain consistently high.

In industrial environments, where heavy machinery requires high-voltage power supplies, electrical risks are heightened. High voltage shocks (involving higher than 1000 V a.c.) can cause burns and damage to internal organs (high voltage cables used to power underground mines are designed to withstand at least 7,500 volts [3]). Shocks from faulty electrical equipment can also lead to related injuries, including muscle spasms, palpitations, nausea, vomiting, collapse and unconsciousness [4].

There are many recorded incidents of devastating fires and explosions within the mining and manufacturing

industries, as a result of undetected electrical faults. In 2006 an explosion at a munitions factory in Gladstone, Queensland, killed 3 workers. Poor machine maintenance was stated as the cause of the blast [5].

More recently, in 2011, an electrical fault at a furniture factory, in Malaga, Western Australia, sparked a massive fire, completely destroying the factory and requiring more than 20 fire fighters to control the blaze [6].

Lost time injuries, as a result of electrical faults and fires, can also create huge costs industrial organisations; a recent study revealed that, within the last 12 years, over 36,000 work days were lost due to electrical injuries within the mining industry [7].

Protecting Machines:

The costs associated with electrical faults don't stop at health and safety.

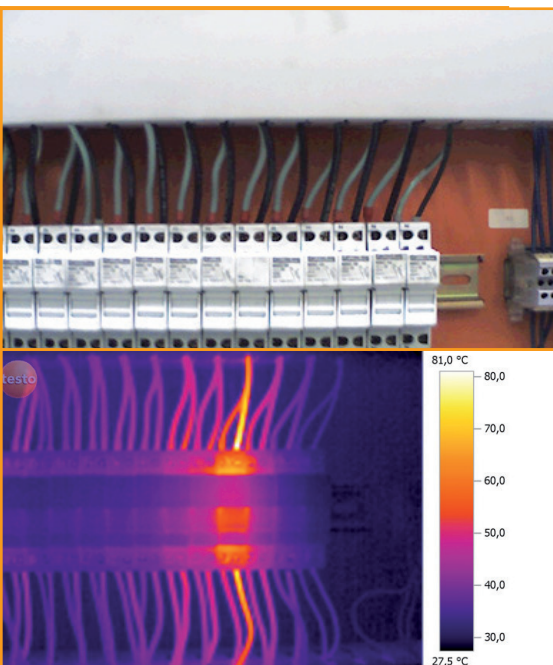
Left unchecked, electrical faults can jeopardising the reliability of a machine; at worst, requiring a full-scale replacement. On average, machinery maintenance accounts for 30-50% of the total operating costs for Australia's mining industry, approximately \$10-15 billion per year [8].

Preventative maintenance allows potential faults to be identified quickly, before they escalate into significant

problems; however, many of these strategies require temporary machine shutdowns while which can become an expensive practice. With the introduction of *Work Health and Safety Regulation 150 – Inspection and Testing of Electrical Equipment*, organisations who fail to regularly inspect electrical equipment can face significant financial penalties [9].

How can organisations carry out essential maintenance checks while minimising costly maintenance checks and downtime?

“Machinery maintenance accounts for 30-50% of the total operating costs for Australia's mining industry.”



The Role of Thermography in Electrical Safety:

Thermography has proven its worth as a tool for preventive maintenance, in order to monitor mechanical and electrical systems or production processes. Thermal imagers provide razor-sharp images and can detect anomalies and weak spots in industrial maintenance and production monitoring quickly and reliably.

Testo produce leading-edge thermal imagers and will be unveiling their latest, inexpensive thermal imaging camera next month. This new camera has been specifically tailored to meet the needs of the industrial sector and enables users to detect potential electrical faults in machinery while in operation, reducing the risks of malfunctions and accidents as well as preventing unforeseen downtime and associated costs.



[1] Work Related Traumatic Injury Fatalities 2010-2011, Safe Work Australia, December 2012:

<http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/730/WorkRelatedTraumaticInjuryFatalities2010-11.pdf>

[2] Electrical Injury and Death, Australian Institute of Health & Welfare – South Australia & Flinders University Research Centre for Injury Studies, April 2007:

<http://www.nisu.flinders.edu.au/pubs/reports/2007/injcat99.pdf>

[3] High-Voltage Continuous Mining Machine Final Rule, U.S. Department of Labor – Mine Safety and Health Administration Office of Standards, Regulations and Variances, March 2010.

[4] Managing Electrical Risks in the Workplace, Safe Work Australia, July 2012:

<http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/699/Managing%20Electrical%20Risks%20in%20the%20Workplace.pdf>

[5] 'Gladstone Munitions Factory Blast "Disaster Waiting to Happen"', Safety in Australia:

<http://www.safetyinaustralia.com.au/safety-news/5283-gladstone-munitions-factory-blast-disaster-waiting-to-happen.html>

[6] 'Malaga Factory Goes Up in Flames', Perth Now, 01 September 2011:

<http://www.perthnow.com.au/news/western-australia/malaga-factory-goes-up-in-flames-early-today/story-e6frg13u-1226127084079>

[7] 'Reducing Non-contact Electric Arc Injuries: An Investigation of Behavioural and Organizational Issues', Center for Disease Control and Prevention's, 2004

[8] 'Maintenance of Mining Machinery', University of Queensland, October 2005:

<http://www.mech.uq.edu.au/courses/mmme2104/chap11/maintenance.htm>

[9] '150—Inspection and testing of electrical equipment', Work Health and Safety Regulations 2012:

<http://www.legislation.sa.gov.au/LZ/C/R/WORK%20HEALTH%20AND%20SAFETY%20REGULATIONS%202012/CURRENT/2012.268.UN.PDF>

We measure it.



Testo Pty. Ltd. Unit 11, 114-118 Merrindale Drive, Croydon South 3136, Victoria, Australia

Tel: +61 3 87 61 61 08

Email: info@testo.com.au

Web: www.testoaus.com.au