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Use of wireless controlled hazard reduction device on welding machines.

This safety bulletin provides safety advice for the NSW mining industry.

Issue

An issue has been identified about the use of a wireless-controlled hazard reduction device (HRD) that maintains full open circuit voltage (OCV) of the welding machine for a predefined period, regardless of whether the operator has struck an arc. This initial time period can be adjusted from one to four seconds with the manufacturer's default value being two seconds. Should the initial weld be interrupted through this arc initiation period, the OCV remains available at the handpiece until the initial arc strike timer has timed out. The OCV may not return to a safe level within the 300 mSec time specified in the relevant Australian and International Electrotechnical Commission (IEC) standards.

Australian and international welding standards have been developed based on traditional welding machines, i.e. iron cored AC welders, generator welders and DC welders. New technology welding machines have enhanced the capabilities of the machines and enabled more effective HRDs to be incorporated in the machines. The new technologies have also enabled significant reductions in size of the welding machines that have improved manual handling safety.

The designs of these new generation machines require the use of non-traditional voltage waveforms and frequencies, and the safety issues associated with these technologies has not been documented in the standards at this time. As such, the effects of contact with energised parts of the welding circuits may not be well understood.

Investigation

The investigation of the issue considered the validity of the issues raised regarding the wireless-controlled HRD sold in Australia. The following was established:

1. If the welding arc is broken immediately following the initiation of an arc, the OCV may rise to a hazardous level for a period of one, two or four seconds depending on the setting selection in the equipment. The manufacturer's default setting is two seconds. After this initialisation period has timed out, the OCV drops to zero volts within 300 mSec as per the Australian welding safety standards requirement.
2. This HRD was designed to provide high integrity weld initiation control on the electrode holder.
3. It is unlikely that an operator wearing appropriate and properly maintained personal protective equipment would come into contact with an energised welding electrode within one second of initiating power to the electrode to intentionally commence welding. However, the probability of this potentially fatal contact would increase for longer initiation periods.

4. The option to require a double push of the initiate button has been designed into this HRD. This feature is not always selected by welding operators. The unintended activation of the welding machine is less likely if this feature is enabled and used.
5. There is a risk of a wireless trigger unit on a separate welding handset initiating another welding machine start if the coding of the wireless handsets is not correctly managed.

Recommendations

1. When introducing welding equipment into a mine, mine operators must undertake a risk assessment, or review any existing risk assessments, ensuring all known hazards are analysed and assessed, with risk controls developed for the design, installation, commissioning, operation and disposal of welding equipment. Such risk assessments should also include human factors when determining the lowest reasonably practicable risk that can be achieved. This risk assessment process must take into consideration all different design and operating properties, whether operating individually or together with other welding units.
2. Where a non-conformance with a recognised safety standard is identified, additional measures may be required to ensure that the established controls provide either an equivalent or better overall safety profile.
3. For inverter welding machines, the voltage waveforms and frequency should be considered in safety risk assessments.
4. Where multiple welding machines are being used at a mine site, management systems should be developed and implemented to ensure two or more handsets are not matched to the same welding machine.

NOTE: Please ensure all relevant people in your organisation receive a copy of this safety bulletin, and are informed of its content and recommendations. This safety bulletin should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

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The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information on which they rely is up to date and to check the currency of the information with the appropriate officer of NSW Department of Planning and Environment or the user's independent advisor.

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