



Electrical Incidents

Key Learnings

ASP Manufacturing

November 2023



HRM Edger Motor

- Whilst setting up a meeting room, two electrical extension leads were discovered that are banned items on the BlueScope Restricted Equipment List. Known as ‘Piggy-Back’ leads, they consist of a 240 Volt extension lead with an additional outlet on the back of the plug. They had not been tagged and tested or connected to any devices.
- These electrical leads had been brought on site without being checked by an electrician.
- ‘Piggy-Back’ leads and double adaptors are banned from BlueScope sites because they may cause an overload condition introducing the risk of fire, equipment damage and electric shock.
Refer to BlueScope Restricted Equipment List – Document [DS.BZ-SEQ-S-10-241.01](#)
- Power boards of the appropriate construction, IP rating and overload protection for the environment may be used as per
BSL Electrical Safety Manual Part 1 – [MA.DIV-ENG-ET-004-01](#), Rev3, sect 1.4.14 (p.28).

Note: Power boards shall not be connected into another power board.



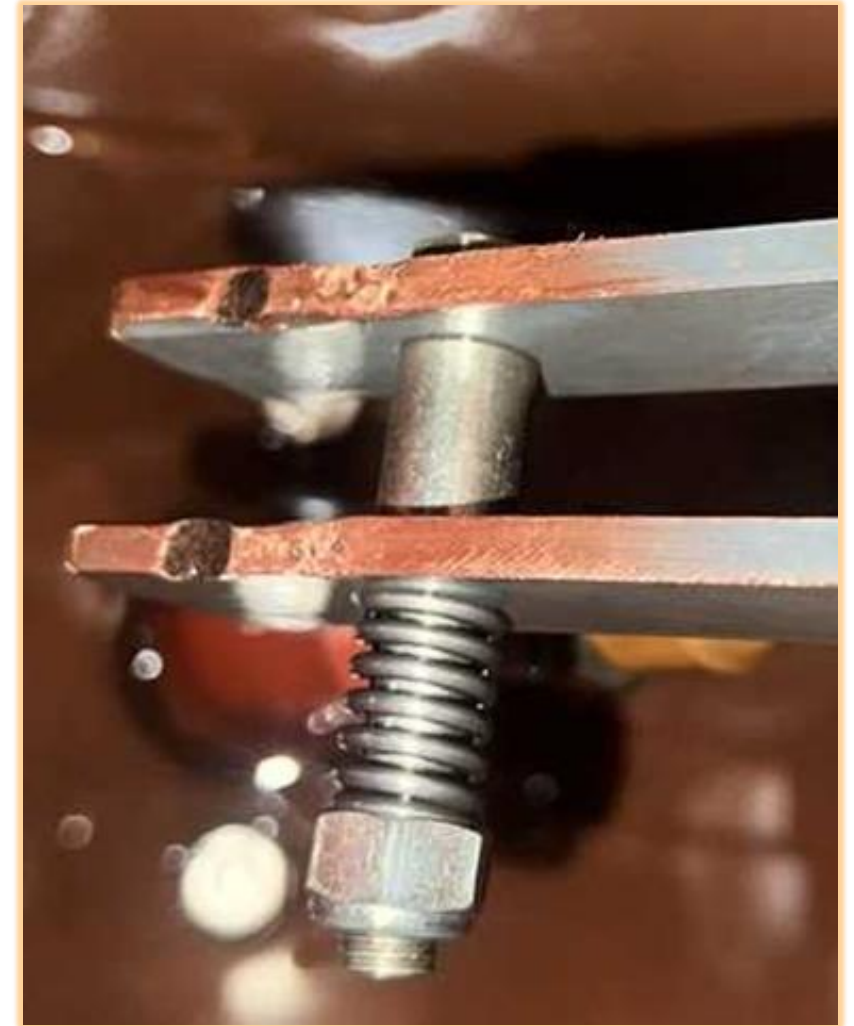
An engineer noticed an unusual noise coming from a 6.6kV switchboard and contacted Power Control to investigate. The noise, which stopped after a short time, was coming from an oil filled switch that was on load.

The switchboard was offloaded, and the switch isolated for inspection. Investigations revealed contacts of the switch were worn and the noise was due to arcing activity in oil.

A good pick up and safe response before the condition grew worse. 😊

It is important to remain aware of your surroundings and to identify unusual noises or conditions as a potential hazard. Respond with care, keep the area clear and report the fault for urgent investigation. Reporting the incident immediately may prevent faults escalating to equipment damage or a serious hazard.

Reviewing maintenance records of equipment found like this will help determine whether procedures are effective or need to be adjusted.

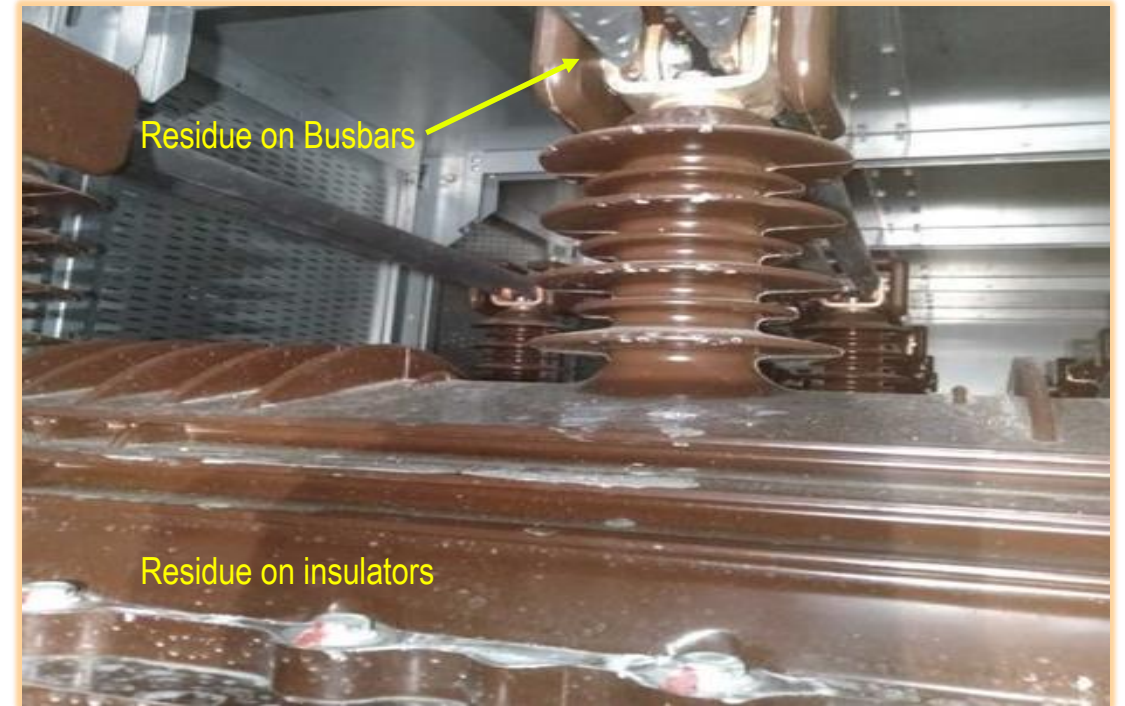
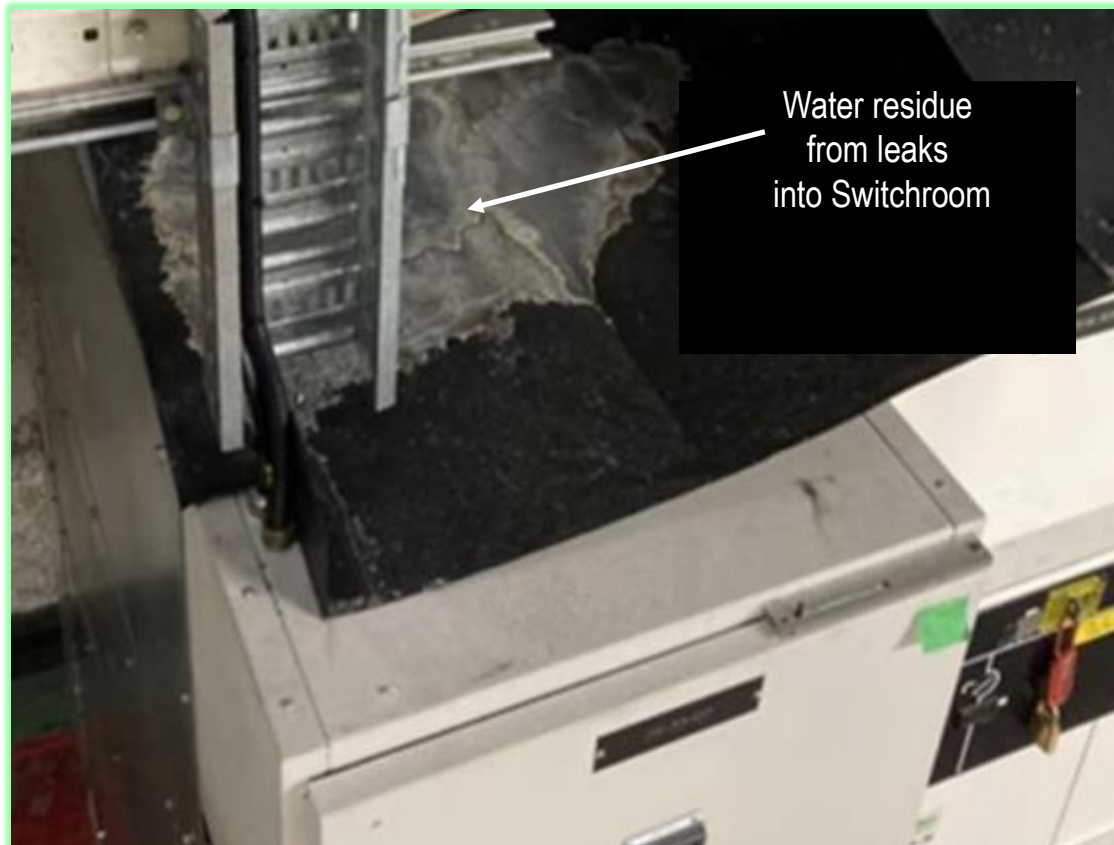


6.6kV contacts showing signs of arcing



Reference: i2398484 – Partial Discharge testing reveals ingress into High Voltage equipment

- During routine maintenance, a partial discharge test picked up noise in a 33kV switchboard.
- Signs of moisture and concrete dust were found inside.
- Deterioration of the surrounding building had resulted in water and residue entering the switchgear.



- Indoor electrical equipment is selected and installed on the basis that buildings provide a level of protection from water, dust, corrosive fumes and extreme temperature. It is essential buildings are maintained to provide the required level of protection.
- Building damage, water leaks, or ventilation faults must be reported and addressed before the integrity of equipment is compromised or the installation no longer safe.
- Temporary shielding may be required to divert contamination until the building is fixed. Equipment must be isolated if conditions are no longer safe.



Smoke around Roughing Mill

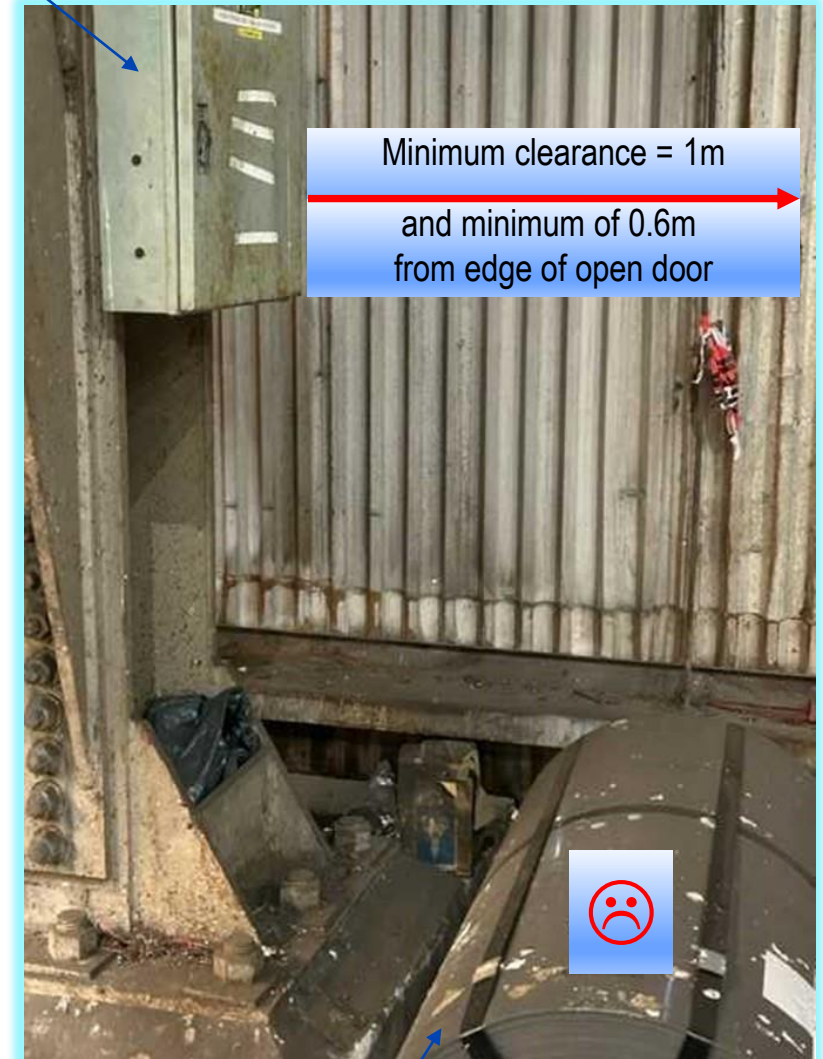


Motor area (photo of motor on front cover of this report)

- A large 1500 kW DC motor overheated & caught fire after the main control board was replaced. The motor had not been run yet, only the fields were energised. An investigation found a redundant control cable was inadvertently connected to the main control board instead of the field current feedback cable. Loss of field current feedback resulted in undetected overcurrent and damage to the shunt field coils.
- The drive had two independent field converters added in 2016 to allow operation using motors with different field characteristics. The original common field converter was decommissioned but the feedback cable was not removed. The original field converter also featured separate overcurrent protection which would have protected against overcurrent in the event of feedback failure, this wasn't part of the new design. The two defects resulted in significant motor damage and a 48 hour production delay.
- De-commissioned equipment should be either fully removed or clearly identified and made safe.
- Thorough design review is required to identify failure modes, effects and controls required.
- Procedures, checks and tests are required when replacing equipment to ensure equipment and protection is functioning correctly.

- Whilst performing the steps of an isolation procedure, an electrician's access to a distribution board was impeded by the storage of steel coils in front of and leading to the board. The coils were incorrectly stored in this location.
- Switchboard Accessibility & Emergency Exit Provisions are covered in the wiring rules:
Refer to AS/NZS 3000:2018, Section 2.10.2.2, (p.136-140) - 1m minimum clearance is required from all faces that need to be accessed & a minimum of 0.6m unimpeded space is required with the door in any position and switchgear racked out.
- Signage and floor markings should be prominent to remind people to keep clear of electrical equipment.
- The installation of appropriately placed bollards (or other mechanical barriers) that still allow access and emergency exit, will also assist in maintaining a clear space.

— Distribution Board mounted on building column



— Steel Coil Blocking Access

Reference: i2394398 – Resistor Banks protective mesh shorting out

- During inspections of a DC Crane, it was noted that the wire mesh guarding of some resistor banks had shorted with one of the resistor power connections and melted a hole in the mesh. Wire mesh was used as guarding to provide a physical barrier whilst allowing heat dissipation via the open weave design.
- The wire ties that held the mesh guarding in place had rusted and broken away, allowing the mesh to flex excessively with crane motion and vibration and then touch live parts.
- Inspection of protective covers and their securing points must be included in maintenance checks, especially on equipment subject to movement & vibration. An audit of cranes with similar enclosures will assist in identifying this potential hazard.
- Rigid covers that have minimal flex (welded mesh, welded to a frame and braced) can be installed with appropriate clearance to prevent contact and still allow adequate heat dissipation. Covers and frames must be equipotential bonded to earth.



DC Crane Resistor Bank Enclosure



Loose Protective Mesh – wire ties broken off



Arc marks where resistors were shorting to loose mesh