



MONTHLY ELECTRICAL INCIDENTS

ASP Manufacturing

September 2021



Power control officers trying to close 11kV switchgear after a down day discovered the 230Vdc closing was missing. The control supply circuit breaker had no voltage at the top of the breaker, further investigation found the 150mm² SDI supply cables at the bottom of the DC flatback panel had been cut. There is evidence of an arc blast on the concrete at the cut location, with molten copper droplets evident. One of the cables is half cut through while the other cable is completely cut with one end showing signs of melting from an arc. The supply cables were traced back to a 500amp Superform switch with one of the 500amp fuses blown. This switch is fed from the standard 230V dc shop supply with a floating supply. Investigation believe this is the action of a copper thief who has cut the positive leg first and then in the action of cutting the negative leg has shorted the two cables to create the arc flash.

As per electrical safety manual 1.4.2.1 working in close proximity to electrical equipment introduces the risk of electric shock or arc blast and flash burn injuries and any item shall be assumed to be live until verified otherwise. Also as per 1.4.2.3 to prevent persons accidentally or inadvertently gaining access to electrical supply equipment all electrical supply equipment shall be suitably secured and only accessible to appropriately trained and experienced persons.



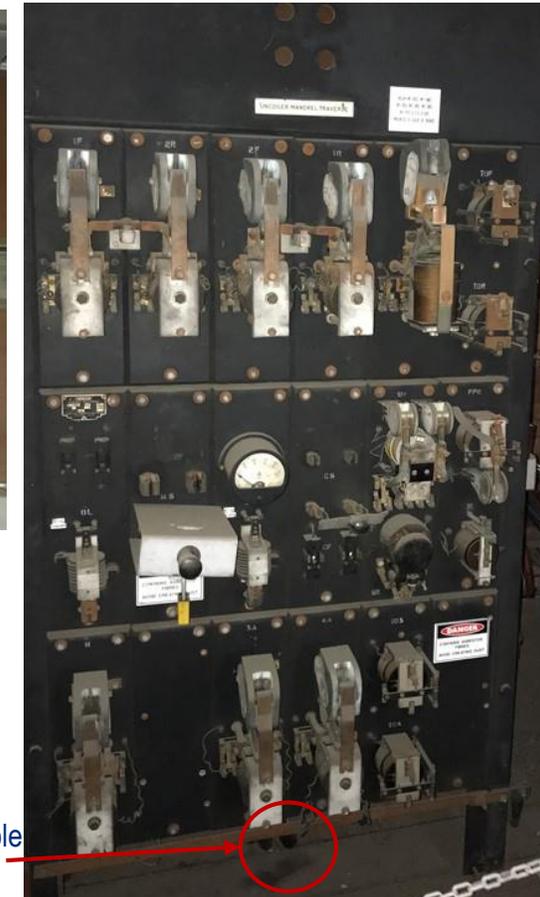
The cut cables as found at the back of the DC flatback panel coming through the floor.
Note the flash mark on the concrete floor below and copper droplets



The cut positive leg cable with melted conductors from the arc flash



The supply 16amp breaker for the HV closing supply



The old DC flatback panel where the breaker was mounted on the back.
Note the incoming supply cables visible coming from below

A shift electrician has been called to No.2 stacker reclaimer machine to investigate why the machine was stopped and had no communications and GPS faults. A pile of ash was observed at the base of the boarding steps, looking up burnt cables were observed entering the slewing turret which contains the main catenary. All cables entering the turret from below were completely damaged by the fire. This catenary has the main 415V ac supply cables to the switchroom and the dc long travel motor cables. Fortunately the fire only propagated along the cables to the first catenary trolley where it has extinguished. It is believed due to the large amount of grease in the turret and poor mechanical protection of the cable, one of the dc motor armature cable's insulation has failed causing an arcing incident initiating the fire.

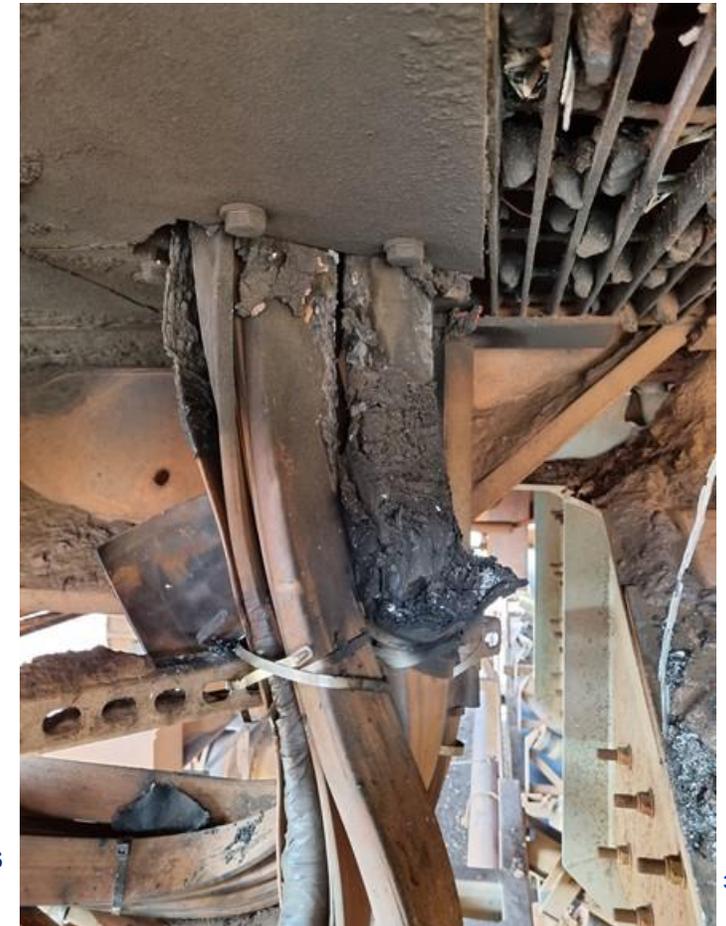
As per the electrical installation manual all cables passing through an opening in a metal structure are to be properly mechanically protected and adequately supported before being fire stopped.



The first trolley of the catenary where the fire has stopped, mainly due to the clapping arrangement

Inside the turret showing all the burnt cables and the point of entry where the fault is believed to have started

The bottom entry to the turret where there is minimal mechanical protection for the cables and the only support is a couple of cable ties



A hot joint was discovered on the load side cable connections of a 100amp CFS switch for an air conditioner system during a plant stop and routine maintenance of a distribution board. All three cores of the 50mm² aluminium cable show signs of a hot joint at the bi-metal lugs. Previous measure had been taken to repair insulation damage at this location, however the cause of the hot joint had not been addressed. Hot joints will become worse over time if not adequately addressed, and may result in significant equipment damage.

It is imperative with power cable terminations the correct cable lug for the type and size cable is used, then crimped correctly to the manufacturers recommendations.



The three aluminium cores covered with glass tape and showing signs of heat damage



The three aluminium cores showing the bi-metal lugs and the damage to each core

An electrician has found the main isolator of an old control panel to be sitting on the ground of an area of plant infrequently visited. A close inspection of the panel found it to be in a very poor state with the door rusted through in places and the internals showing signs of excessive water ingress. The terminals of the main isolator were found to be energised with 240V ac, despite the equipment no longer being use. The panel is believed to be a redundant part of No.3 Furnace which was de-commission in 2011 and owned by a third party who did not make it safe and remove it at the time. As per the BSL guideline for disconnected cables DIV-ENG-009 all redundant equipment is to be isolated and made safe with all cabling removed, or managed as per the guideline.



The poor condition of the front door of the panel and the position where the main isolator handle came from

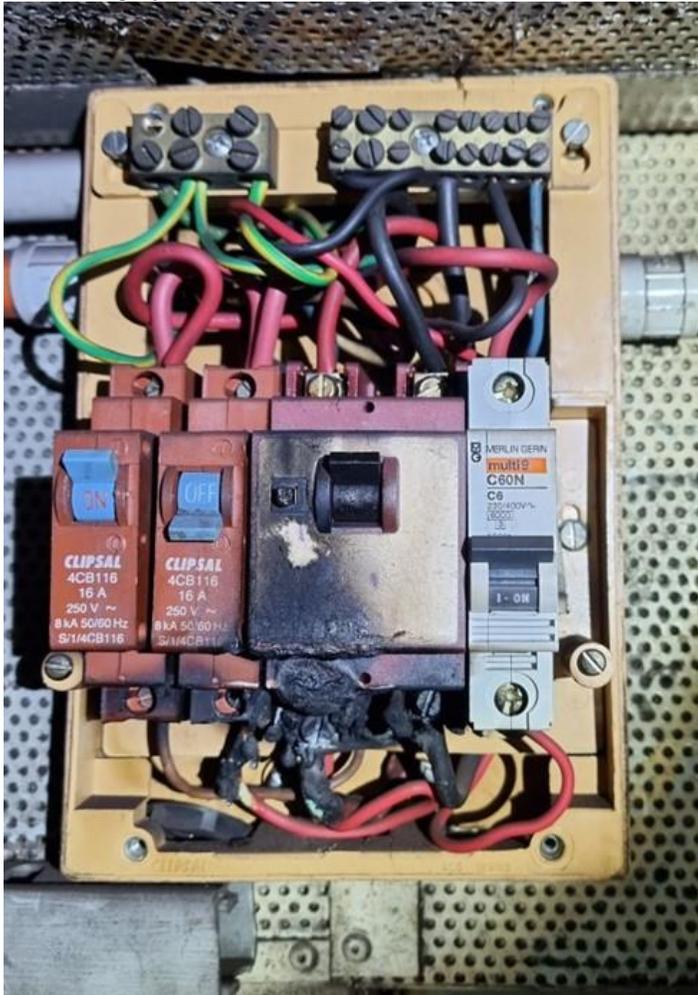
A view of the panel internals and condition



A close up of the door internals with water ingress very evident, also the back of the isolator with the energised terminals

An electrician has noticed the lights and air conditioner not working in an operators cabin. The small distribution board inside the cabin was found with a large burn mark below the main switch and the outer plastic enclosure melted. A hot joint had developed on the active conductor of the RCD breaker which had started to melt the breaker. A large steam leak below the cabin a couple of weeks before the board was discovered may have caused moisture to enter the non IP rated enclosure.

The integrity of all electrical equipment should be checked on a regular basis to ensure the installation is suitable for the environment and conditions it may encounter.



The inside of the distribution board with the hot joint on the RCD breaker



The distribution board as found with the melted plastic section below the breaker

Port Kembla security controller was alerted by alarms when a number fire panel communications links were down. An investigation has found copper thieves have broken into the cable launder and bridge adjacent to A-27 switchroom. A large number telephone cables were effected which provide the backbone for the fire security system and alarming. Other cable cut or damaged were network cables, earth cables and telemetry signal cables.



A number of photos of the cut cables found



The cable launder/bridge where the cables were cut.
Note the cut earth cable on the roof



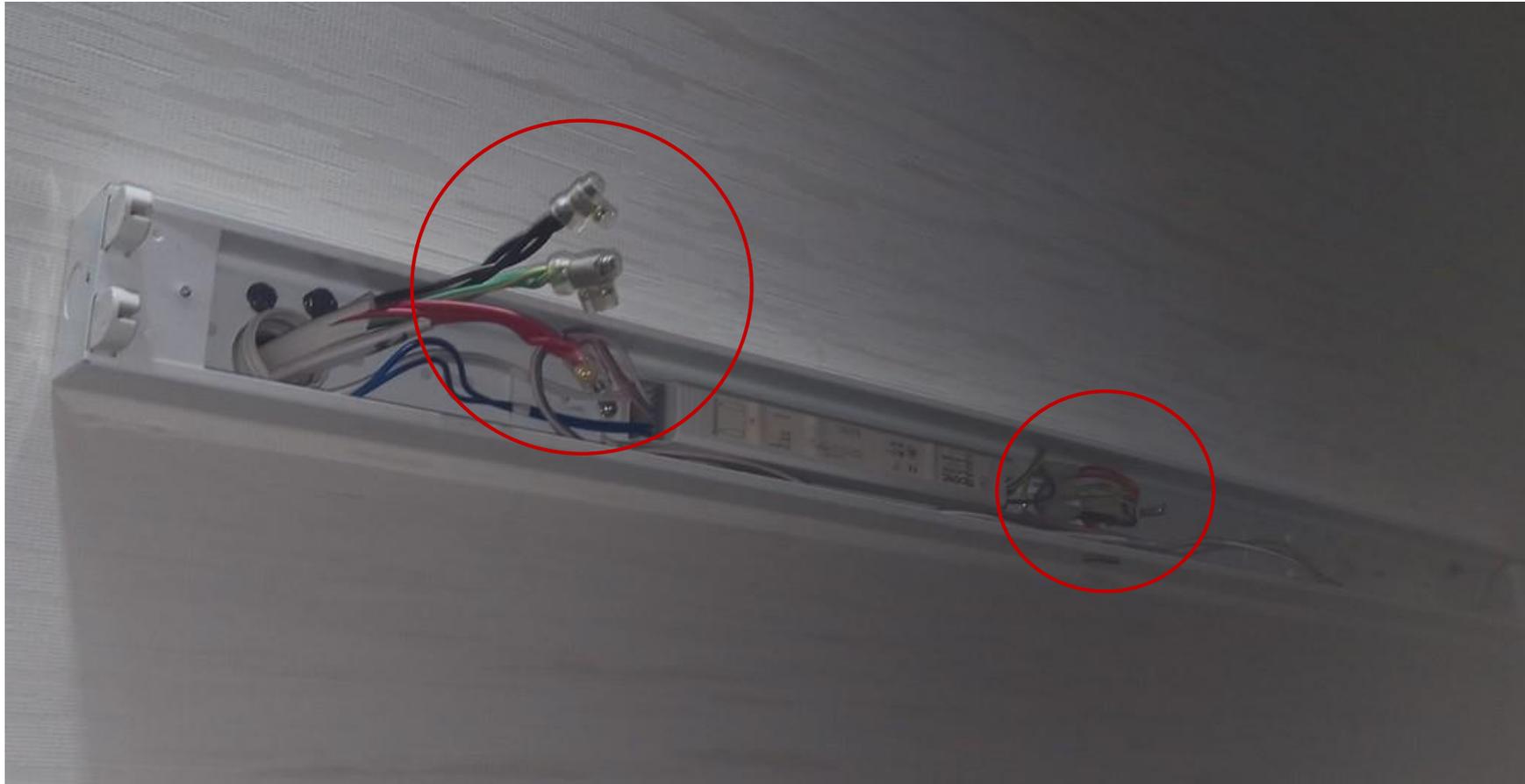
The hole cut in the fence to gain access



An electrician and an apprentice changing a light fitting have found two supplies in the one fitting. When conducting Test Before You Touch the lighting supply was correctly tested and identified. Also inside the light fitting through a different penetration were two cables PB connected but not connected to the light fitting. TBYT found these cables to be still energised. They were found to be part of an outlet power circuit and the light fitting had been used as a junction box.

It is essential before commencing any electrical work Test Before You Touch must be conducted to ensure all conductors are isolated and proven de-energised.

It is not good practice to run two different supplies into the one device as it is a potential trap for electricians who are unaware of the installation. Multiple supply sources must be clearly identified where used.



The light fitting with two supplies.
In the centre is the lighting supply penetration into the fitting.
At the left hand end is the two looping cables penetration for the outlet power circuit.