THERMOGRAPHY IN FOCUS

Industrial Electrix regular feature on infrared images from members of the Australian Professional Thermography Association Inc.

Pay Attention or Pay a Price

For professional thermographers, conducting a thermography survey is a proven, cost effective way of early identification of electrical faults and, therefore, saving the asset owner downtime, lost production, anxiety & frustration. Unfortunately, there are times when due attention has not been paid to the thermography survey report.

By Mike Henneker, Member AUSPTA Management Committee

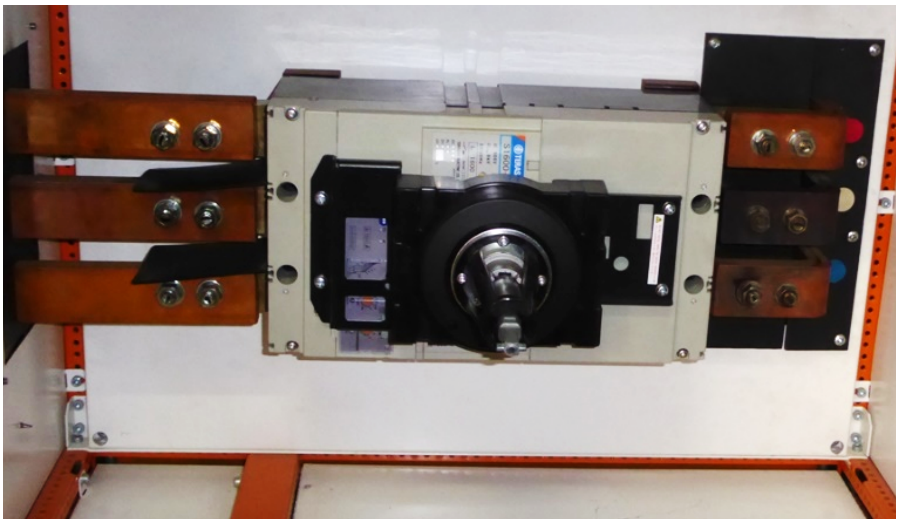
During a recent annual thermography survey of a production plant a 1600 amp MCCB was identified with abnormal thermal patterns internally and on the centre (white) phase. This MCCB had previously been replaced around 2 years before this survey, after being identified with similar abnormal thermal patterns and excessive operating temperatures. Initially we identified that the MCCB was not overloaded with the load being in the 1200 – 1400 amp range when measured.

CASE IN POINT

As we could not determine the cause of the abnormal heating our recommendation to the maintenance manager was to connect a waveform analyser and power monitoring equipment. This was to ascertain if harmonic distortion was affecting the operation of the MCCB and to monitor the load over an extended period to document any load variations and if there were any load spikes.

The MCCB was replaced after our report had been issued and a follow-up survey was conducted to confirm that the abnormal heating issues had been rectified. The follow-up survey confirmed that the abnormal heating issue had been resolved with the replacement of the MCCB. At the next annual survey and other subsequent surveys, we could see that the displayed thermal patterns on the MCCB were again becoming more abnormal. This was associated with an apparent temperature rise internally in the MCCB and around the centre white phase connections.

The exception and Delta-T readings were not evaluated as a Priority 1 however the evidence was conclusive that the exception was becoming worse. After each thermography survey the abnormal heating was noted and reported to the Maintenance Manager.



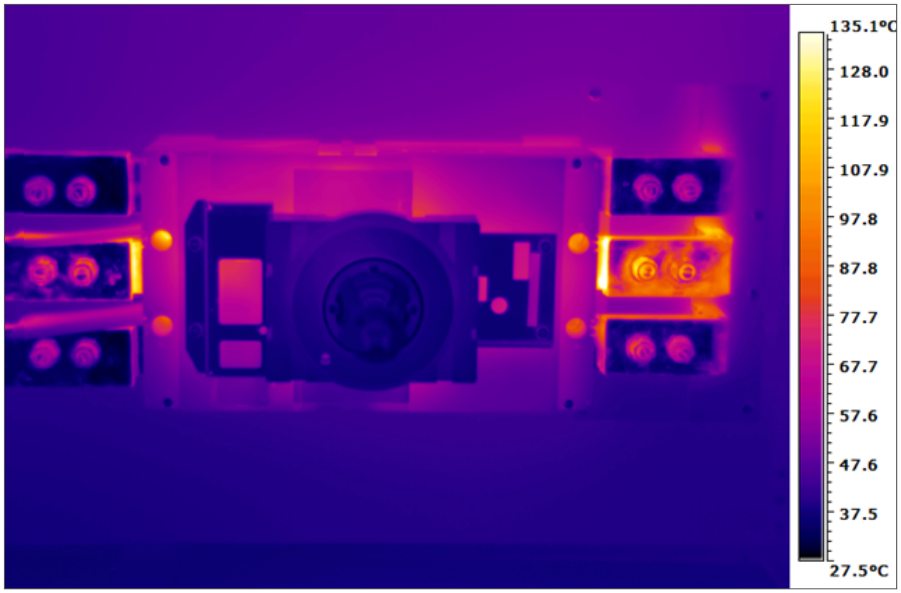
The MCCB seven days before the explosion and switchboard fire showing the discoloured and scorched middle white phase busbar on the RHS of the MCCB

When this last survey was conducted it was approximately 2 years after the original MCCB had been replaced. The abnormal thermal patterns & apparent temperature rise on the MCCB had been reported after each survey so I was alarmed when we opened the panel and felt the extreme heat emanating from inside the MCCB cabinet.

The thermal patterns around the centre white phase were indicating an anomaly which was originating from inside the MCCB. The apparent temperature of the exception had risen from the previous survey by approximately 30°C. There was also visible discolouring & scorching on the RH copper busbar connected to the MCCB. Given the history, this was now a Priority 1 fault and needed immediate action for rectification.

The maintenance manager was informed of the P1 thermal anomaly immediately and we did emphasise the importance of a rapid response by his maintenance team. The thermography inspection report was compiled the same night and emailed to the maintenance manager. A subsequent email was sent to confirm that he had received the report, again emphasising the criticality of the fault.

Depending on the type of exception, it is impossible to predict a failure based on temperature. However, training and experience over many years of conducting thermography inspections and looking at thermal anomalies, alerted us to the fact that we had identified a very serious issue in the MCCB.



Thermogram of the MCCB before it exploded and caused a fire. Apparent temperature on the RH white phase near the body of the MCCB was 147°C. Apparent temperature on the LH white phase near the MCCB body was 136°C

The switchboard was destroyed by the explosion and fire

RESULT OF INACTION

Appropriate action was not taken immediately and 6 days after the report was submitted the MCCB exploded, destroyed the switchboard, and the plant was shut down.

Rectification cost and production losses were substantial and the ramifications of such a preventable failure were also measured in job losses at the plant.

IN SUMMARY

- Thermography is a proven predictive/ preventive maintenance tool and when utilised by trained technicians can identify thermal faults early, well before equipment failure.
- Not paying attention and not acting on the results of a thermography survey in an appropriate time frame can be catastrophic and cost many thousands of dollars. In this case early investigations into the root cause of the abnormal heating may have prevented this failure.
- While thermography effectively identifies thermal faults, it is impossible to predict the actual timing of failures based on temperature only.
- A detailed and comprehensive thermography inspection report that identifies thermal faults for clients is vitally important for the safe and reliable operation of electrical assets and cannot be underestimated. IE

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