

# 5MVA Transformer Urgent Inspection and Repair

## Customer

Queensland Coal Mine

## Background

The mine in Southern Queensland has been supplying coal to local power stations in the area for over thirty years. The mine approached Ampcontrol due to concerns about the condition of a production critical 5MVA transformer on their plant.

## Problem

Our review of their latest oil analysis results indicated the occurrence of a serious T3 Thermal Fault – high-temperature heating (>700°C). The presence of acetylene & elevated levels of heating gases in the sample pointed to the severity of the fault and possible involvement of electrical contacts.

Transformer specialists from Ampcontrol in Mackay went onsite and conducted an internal inspection. Oil was drained to the top of the core and the inspection lid removed. The team identified what could have contributed to the elevated gassing in the DGA results. The paper on 1-off LV lead connection had significantly carbonised, and as such we recommended immediate action to further investigate the problem.

The Transformer was immediately transported to Ampcontrol's transformer facility in Newcastle, NSW to carry out further inspections and the necessary repairs.

The internal inspection identified a partly unsecured and dislodged coil clamp block under the top core frame. A small amount of arcing discharge between some of the core steel sheets in the outermost step of the top yoke, located in the A-phase LV side of the transformer was also found. Four hot joints in the LV leads were found, and these were the most likely cause of high-temperature fault gasses in the oil. The hot joint observed on C-phase was quite severe as the heat had travelled down close to where the LV leads exit the winding. We believed the hot joints were caused by inadequate preparation when crimping the copper lug to the aluminium winding conductor.

Our detailed workshop repair program included replacement of damaged and incompatible materials that contributed to the heating problem, and a partial rebuild of the clamping structure. The core and coil assembly were processed in a vacuum oven, followed by vacuum filling and hot oil circulation to further 'filter' the liquid insulation of water, gasses and particles/debris. Electrical testing was conducted in our Newcastle workshop before being transported back to site.



Burnt winding connection lead with a large crack (yellow arrow)



Winding connection leads with severe carbonisation (burning) of paper insulation.

## Achievements

- Reviewed oil analysis results and provided remote technical support to help manage a serious problem with a production critical transformer.
- Provided onsite emergency support at short notice including an internal inspection that identified possible causes of the problem.
- Conducted a workshop internal inspection and detanking of core at short notice to further investigate the causes of the problem.
- Undertook a repair program that put the transformer back into safe operation quickly.

↑ Ampcontrol provided both onsite and workshop specialist transformer services at short notice