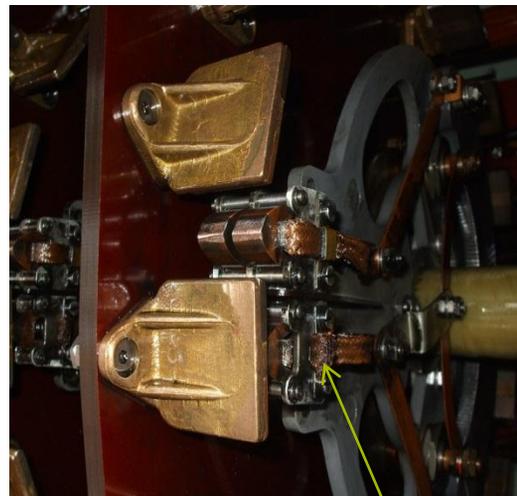




Transformer Tapchanger Braid Inspection

Following restoration of supplies after the isolation of an 11kV cable fault, the 11kV output voltages from a Primary 33/11kV 7.5MVA Transformer were found to be unequal and slightly reduced on two phases only. The problem was traced to a burnt-through braid coupling the main tapchanger (33kV) contact on one phase. Current was still flowing through the phase due to the fortuitous, and relatively high resistance, path of the contact mounting and retention components. The transformer was supplying a light load, and the 33kV load current had not caused further significant burning of these parts. Had the transformer been highly loaded it is probable that the defect would have rapidly developed and caused a disruptive failure.



Burnt through braid

Investigation showed that the braids had burnt through due to the cable fault current. This occurred only because many of the fine copper strands of the braid had previously mechanically broken, due to the repeated flexing over the many years they had been in service. Copper naturally work-hardens and becomes more brittle after repeated flexing. The few remaining strands had satisfactorily carried the low load current, but burnt through during the cable through-fault current.



New braids fitted

The tap changer had been maintained approximately 12 months before the event. However the maintenance had not picked up the partially broken contact braids.

The design and application of current carrying flexible copper braids in tapchangers varies considerably between makes and types, but all need careful inspection during maintenance.

Recommendations and action points

- All staff involved with tapchanger maintenance should be aware of the mechanical deterioration of contact braids, and the need to carefully inspect them for broken strands.
- Contact braids found with broken strands must be replaced in line with the Maintenance Manual requirements.
- All replacement parts must be identical to those being replaced, or be replaced with alternatives that are specifically approved.