

TOTUS Bushing Monitoring

Protect your most critical assets



Proven in the field to detect and identify:

- Short circuits
- Contamination
- Ageing
- C2 issues
- Arcing
- Cavities in Resin

The Challenge for Asset Managers

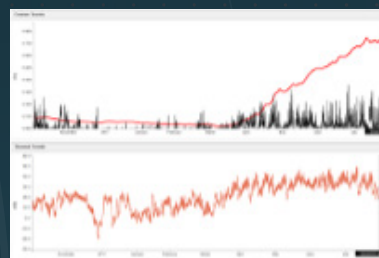
According to statistics published by IEEE, IEC and CIGRE, bushings contribute to almost 30% of transformer failures globally. In almost 50% of cases the failure resulted in catastrophic consequences such as fire, tank rupture and explosions.

The Solution

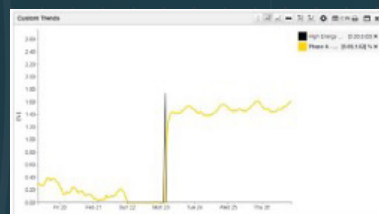
Minimise the risk with TOTUS Bushing Monitoring Online monitoring of bushings, through monitoring of internal insulation (capacitance / Tan Delta or Power Factor) and the internal electrical activity (Partial discharges) enables asset managers to detect a fault at its very preliminary stage, allowing action to be taken before reaching a critical and irreversible stage.

TOTUS allows for correlation and causation to determine failure modes, driving prescriptive actions.

Did you know the TOTUS Bushing Monitor has saved over \$10M in damages to bushings for our customers including RIP bushings, thanks to monitoring a combination of leakage current & partial discharges.



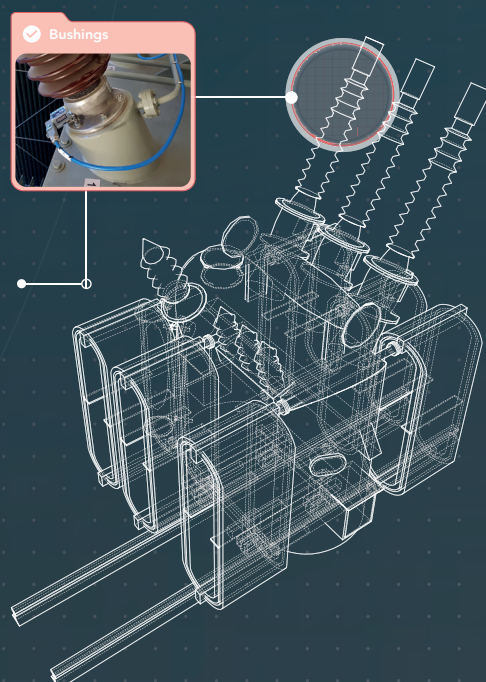
Relative change of Tan Delta and Partial Discharges show insulation losses due to contamination



Relative changes in Capacitance plus Partial Discharges show short circuits

We monitor the following:

Partial Discharges	Dedicated trend for Partial Discharges in bushings Arcing events
Leakage Current	Currents amplitude and phase Current polar plot
C1/PF	Tan Delta/PF variations C1 and C2 variations
Others	Temperature Load Humidity





Spotlight:

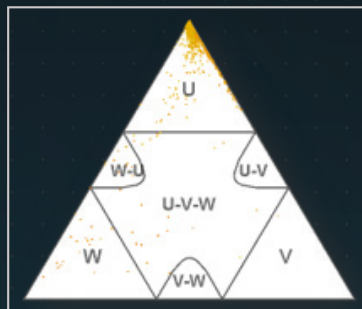
The benefit of monitoring Partial Discharges in Bushings

TOTUS is the ONLY Transformer Monitor that can separate PD in the Bushings from PD in the Main Tank.

Early detection of PD can significantly improve risk diagnosis, driving quick and accurate decision making. Recognising the PD pattern makes it possible to understand the nature of the defect and correlate with other parameters to determine the best technical action.

Online PD monitoring can:

- Detect anomalies at EARLY stage of degradation, in particular on RIP bushings
- Detect failures not easily detectable with standard tests
- Correlated PD with Leakage current to determine failure mode and indicate appropriate offline test



Camlin PD Triangle identifies the winding and phase



Reliable connection to the bushing >> 2000 installations



Spotlight:

Resin Impregnated Paper bushings (RIP)

RIP bushings are made with a void-free impregnation process, designed for a Partial Discharge free operation. However, a combination of extraordinary operating and external events can result in PD in the bushings. The resin material is not able to withstand the PD activity and will lead to fast degradation and short circuit.

Monitoring PD within the bushings is critical and allows early detection of faults, allowing for fast diagnoses and action. The Image to the right shows PD trending in bushings on a RIP bushing.



Technical Details

24/7 continuous monitoring

Automatic learning period

Dedicated PD trend analysis for bushings

Configurable averages

Hourly summary of current, PD, Capacitance and Tandelta



camlin energy

Camlin Energy Ltd || www.camlingroup.com || Tel.: +44 (0)28 9262 6989