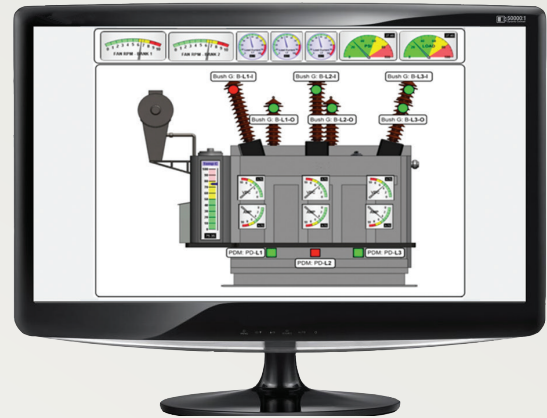


Improve Network Planning Through Hot Spot Monitoring

FIBRE OPTIC SENSORS

Network planning is a complex process. It involves dealing with many unknowns and uncertainties, usually with a fixed pool of money to further complicate decision making. And of all the assets to plan for, transformers are one of the most important and unpredictable.

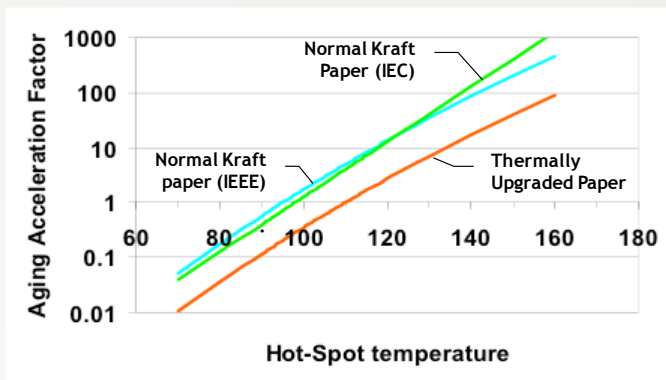
With temperature being a key determinant in the life of a transformer, hot spot temperature monitoring is one of the most effective and reliable tools for introducing predictability into the trending of transformer life and optimising network planning.



TEMPERATURE IN TRANSFORMERS

That temperature dictates aging and determines transformer life expectancy is a well known fact – with hot spot temperature being the most critical to these equations. Traditionally hot spot temperatures have been modelled using a winding temperature indicator (WTI). However this modelled approach has significant inaccuracies ($\pm 15^{\circ}\text{C}$ with a further $\pm 3.5^{\circ}\text{C}$ due to the device).

To put this in context, the IEC loading guide shows that hot spot temperature increase of 20°C equates to about 90% reduction in life of the transformer and an increased risk of premature failure.



NEW IEC, AS/NZS STANDARDS RECOMMEND FIBRE

As a result of the high sensitivity of transformer aging and premature failure to hot spot temperature increase, the new (2013) IEC and AS/NZS Power Transformers Standard (60076) recommends direct measurement of hot spot temperature rise through the installation of fibre optic sensors.

In making this recommendation, the standard references the “radically increased possibilities to obtain proper thermal modelling of power transformers, especially at step changes in the load current”, made possible through fibre optic sensors. For three phase transformers, fibre is recommended for 20MVA and above.

IMPROVING DESIGN, MANUFACTURE AND OPERATION

The ability to accurately monitor hot spot temperatures within a transformer opens up several new possibilities:

- Verify correctness of hot spot calculation models
- Confirm “real” ratings of new transformers via heat-run test results (to ensure the transformer rating respects the nameplate)
- Maximise loading without compromising life
- Avoid hidden overloading of transformers due to inaccurate hot spot modelling
- Safe short-term overloading: control exact transformer ageing
- Effective cooling management: greatly reduced time lag in activating cooling mechanisms

“An increase of 20°C hot spot temp = 90% reduction in life of the transformer”

FLEET AND NETWORK OPTIMISATION

This one tool can make a huge difference for transformer fleet and network planning managers. Reliability in the transformer monitoring function leads to fewer failures, increased operational and planning certainty, and improved asset utilisation – a better performing and more efficient network.

Accurate

Continuous hot spot temperature monitoring and modelling the ageing of the insulation

Visibility

Visualise long term performance and ageing, highlighting priority assets

Trending

Forecast the expected life of each unit in the transformer fleet; use to improve network planning and regulatory proposals

Condition Based Maintenance

Direct attention to assets that need it most; don't waste resources on routine time-based inspections

Maximise Revenue

Utilise under-loaded assets to their capacity; safely leverage short-term overload where required

Reduce Capex, Opex

Minimise loss of life due to premature ageing or failure; and delay asset replacement

Lower Risk

Minimise exposure to risk from undetected ageing, catastrophic failure; optimised asset management

Redirect Cost Savings

Redirect newly freed capital to other areas of the network where it is needed

REMOVE UNCERTAINTY

Fibre optic hot spot monitoring can help you to answer (and provide a solution for) each of these important questions:

- » Am I unknowingly **overloading** and damaging my transformer faster than I realise?
- » Am I increasing the **risk of premature or catastrophic failure**?
- » Am I unknowingly **underloading** and potentially missing out on additional revenue?
- » Am I missing out on the benefits of **condition based maintenance** through online monitoring of hot spot temperature, a critical factor in ageing?
- » Am I able to better monitor and manage effective **cooling control** of my transformers remotely?
- » Am I missing out on the ability to better **predict the true life** of my assets and thus be able to better plan for Capex, Opex and Risk in the future?

STABLE AND RELIABLE

Now with over 30 years field experience, fibre optic technology is recognised as a viable and necessary tool for transformer optimisation, through accurate hot spot temperature monitoring.

Qualitrol-Neoptix offers the largest range of solutions, built for stability and reliability under arduous conditions – from the sensors, to handheld devices, rugged online monitors, and fully modular OEM systems.

Get more info on the advantages of fibre optics and the Qualitrol-Neoptix range at www.insulect.com/fibre-monitoring

