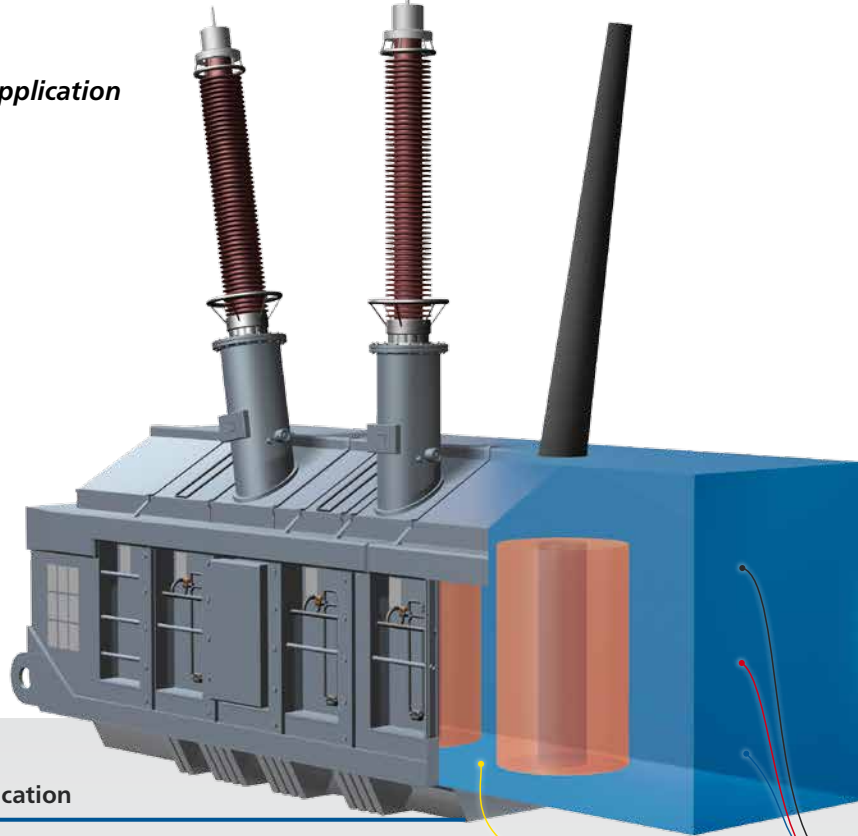




Application

Pinpointing a needle in a haystack

Acoustic partial discharge localization with PDL 650 and MPD 600

The Italian service company GB Services in Concorezzo has made several successful tests on power transformers using OMICRON's PDL 650 and MPD 600. The combined approach of electrical partial discharge (PD) detection with MPD 600 and acoustic PD localization with PDL 650 allows manufacturers and service and maintenance teams to pinpoint faulty elements and make the right decisions for repairing them in the factory and on site. GB Services examined a new 80 MVA, 240/135/16 kV transformer showing a suspicious discharge noise while it was still in the factory.

Partial discharge in transformers might be observed if the insulation material between different voltage potentials is faulty or inhomogeneous. If PD is not detected soon enough and eliminated by repair, it can increase when voltage is applied. A complete discharge may destroy the insulation and hence the entire transformer. Aside from the obvious risks that go along with the explosion of a transformer, immense repair and replacement costs as well as device outage time can also be consequences.

Tracking down partial discharge

Accurate transformer testing is necessary for detecting PD in its early stages and for taking adequate measures to ensure a long lifetime for the transformer. Due to relevant standards, partial

discharge tests are mandatory in the factory before delivering a new or repaired transformer to site. With modern measurement technology these important tests can even be carried out on site.

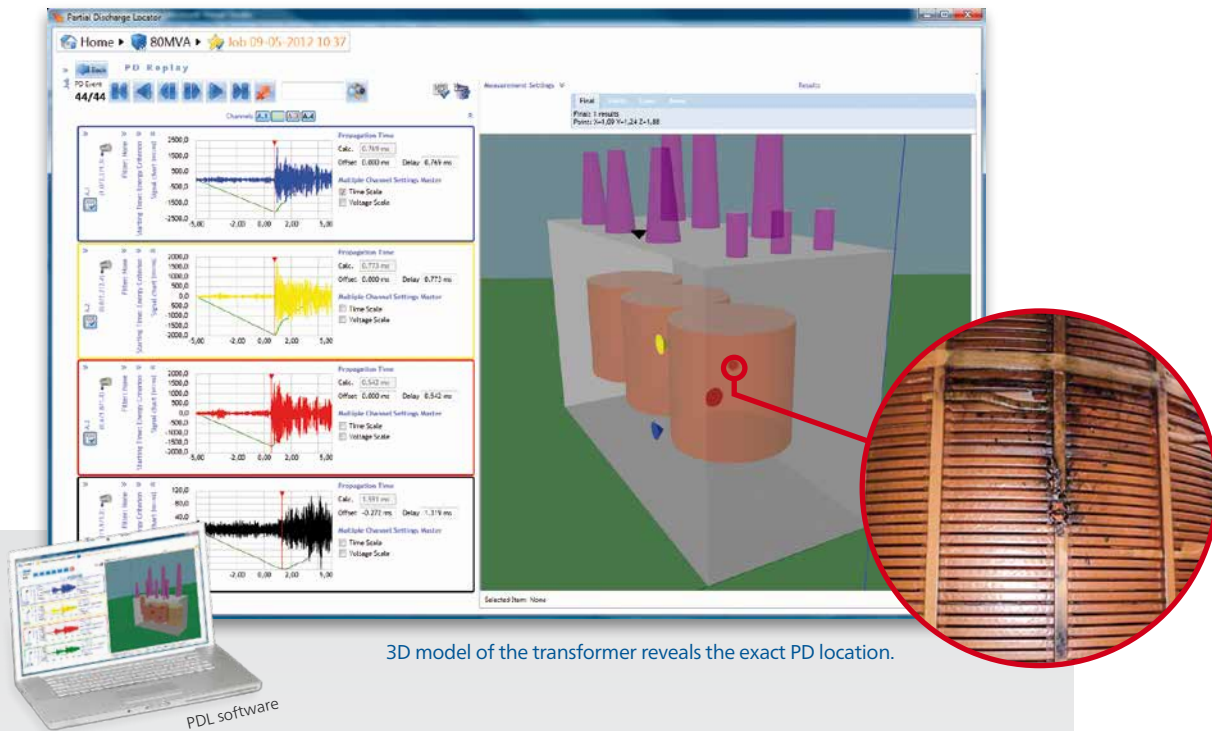
Being able to locate PD sources has many technical, financial, and organizational advantages. Small and hidden faulty zones which are difficult to detect visually can be identified at an earlier stage under voltage. Repairing transformers can be costly and time-consuming and PD localization under on-site conditions helps the user decide if sending the transformer back to the factory is actually necessary. Furthermore it allows repair plans to be optimized by anticipating material sources, tools, repair slots, and resources.

PDL 650

- > Efficient: predictable repairs and spare parts
- > Sustainable: easy creation of reports and records
- > Safe: galvanic separation of operator from high voltage
- > Handy and battery-operated

 www.omicron.at/pdl650





New transformer with discharge noise

A newly manufactured 80 MVA, 240/135/16 kV transformer showed discharge noise while it was still in the factory. Acoustic PD detection was performed with OMICRON's PDL 650, connected to an MPD 600 PD analysis system and a PC. Specific PDL 650 sensors were placed at different positions on the transformer tank. The MPD 600 unit acted as trigger to start the acoustic acquisition with the PDL 650.

Discovering the defect

To discover the exact fault location it was necessary to document the precise position of the acoustic sensors. A reference point was defined, and then the distances between all of the sensors in the 3D coordinate system were determined.

PD measurements were performed at different voltage levels. Due to the high PD level on phase U it was assumed that PD was located close to this phase. The PD level on phase V was also measured due to cross talking between phases U and V.

The PDL 650 software offers different possibilities for visualizing possible fault locations: half-spheres, circle lines, and points. A helpful key feature is the 'quick design tool' which allows a virtual 3D transformer model to be created easily for better orientation. The sensor positions are displayed using a color code and the transformer model can be rotated on the screen for an optimal view. ▶



Massimo Saottini

Diagnostic Services Manager, GB Services

«The PDL 650 is an ideal addition to our MPD 600. It allows us to look inside the transformer without having to open it. Since it is so easy to use it is the perfect tool for practical use in the factory and on site.»



In order to allow the large group of attendees to follow the measurement more easily, the PC display was also projected on a provisory screen that was mounted to the transformer tank.

GB Services

GB Services in Italy grew out of the many years of experience of professional experts responsible for measuring instruments for industrial and scientific applications. In addition to selling equipment for medium- and high-voltage laboratories, GB Services provides consulting and specialized technical assistance. Their extensive level of experience spans more than 30 years and allows GB Services to design and implement very complex solutions.

► Decision for repair

A fault was located in the upper part of the phase U winding, near the connection of the low-voltage phases. With the help of the transformer model the origin of the fault was identified quickly and led to the decision to open the transformer and extract the winding for inspection and repair.

The fault was hard to detect visually since the PD source was situated between the windings. The damage was observed in the exact location indicated by the PDL 650 software. Being able to localize the

fault precisely saved a lot of time and costs, since the transformer only had to be opened once and more extensive damage was avoided.

Convincing testing method

For Massimo Saottini, Diagnostic Services Manager of GB Services, PDL 650 provides a wide range of possibilities for the predictive testing of transformer maintenance. Giuseppe Inzirillo, Sales Engineer at GB Services, also sees the many possibilities that the PDL 650 can be used for. "Italy has a large number of transformers, all of a certain age. Beyond this, the country has several factories for producing new transformers, repairs, and maintenance services. The device is very helpful for evaluating risks and saving time and money and it might also be interesting for utilities, larger industries, and companies that handle bigger projects." ■

«The PDL 650 is very helpful for evaluating risks and saving time and money.»

Giuseppe Inzirillo
Sales Engineer, GB Services



Till Welfonder

Regional Sales Manager Europe and Africa, OMICRON