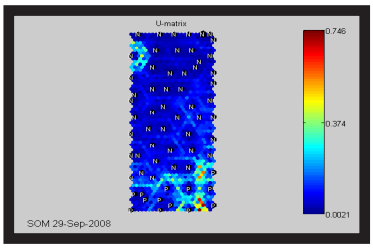
TNB RESEARCH

Seeding Fund Project

Development of a Decision Making Software for the Determination of Partial Discharge Occurrence in 33kV Power Transformer using DGA and Artificial Neural Network (TNB 722/2007)

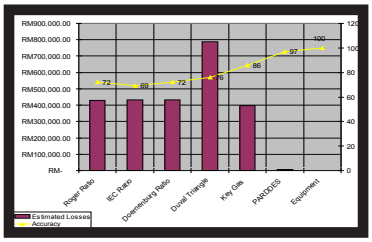
Project Overview

Partial Discharge (PD) activities in the transformer insulation paper will accelerate the degradation of the insulation paper. The amounts of dissolved hydrogen together with methane are used to detect PD activities. Hydrogen may be produced by other means in the transformer, which made it is difficult to do the interpretation on the PD occurrence by using the available methods such as IEC Ratio, Dornenburg Ratio, Rogers Ratio and Duval Triangle.



Self Organizing map Output

This research has achieved its objectives, where it has improved the partial discharge detection accuracy based on modified Dissolved Gas Analysis (DGA) interpretation method and Artificial Neural Network (ANN). The relationship between partial discharge activity and DGRA has been trained and validated by using artificial neural network. In addition, a standalone PD detection software (PARDDES), has been developed by using Artificial Neural Network and Visual Basic which will enable future detection on the PD occurrence based on DGA only.



The savings using the PARDDES software

Deliverables

The main purpose of this research is to improve the partial discharge detection accuracy based on modified Dissolved Gas Analysis (DGA) interpretation method and Artificial Neural Network (ANN). This work comprises of the following sub-objectives:

a)To train and validate the relationship between partial discharge activity and modified DGA data by using artificial neural network.

b)To develop a standalone PD detection software by using Artificial Neural Network and Visual Basic which will enable future detection on the PD occurrence based on DGA only.

Benefits

The PARDDES can help the field engineers to better identify the PD occurrence in power transformer before initiating an acoustic PD testing. This can save a lot of money due to better identification than the conventional method. In addition, the PARDDES can save more than RM 388k for 29 test data if compared to the other conventional methods. The accuracy of the software is around 97%, which is better than the conventional methods. This software is recommended to all field engineers who are in charge of 33/11kV transformers. This software can be trained to suit transformers other than MTM, if the user has sufficient data. The software will improve the level of confidence of Asset Manager in planning their maintenance work. This will reduce the maintenance cost of doing unnecessary PD testing due to misdetection, thus will improve assessment reliability.