



ENGING

MAKE SOLUTIONS

ONLINE PREDICTIVE MAINTENANCE

**EMS TCM
POWER TRANSFORMERS CONDITION MONITORING**



How it works?

Enging's TCM system is a fully integrated solution to monitor the most valuable asset in an electrical grid and in the industry: **Power Transformers**.

The developed system is able to perform an early fault detection and the condition monitoring of these assets. This system is based on innovative diagnosis methods to detect faults in power transformers windings, core and on-load tap-changer.

The diagnosis methods only require the data acquisition of the electrical variables, such as voltage and current, already available in the substation house through the conventional current and voltage transformers, to provide a clear indication and localization of faults, with a non-invasive measurements and without investment in new measurement devices.

This approach makes this system very sensitive to all variations in the internal transformer's parameters, allowing therefore to make an early detection of faults and provide alarms to the operator in order to avoid an early expensive outage due to a fault. Through the dedicated software, the operator can easily visualize all data in real-time, alarms information and the actual transformer's state. Moreover, it allows to perform historical trend analysis in order to easily correlate different information.

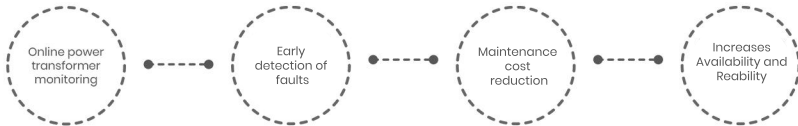
This system is applicable to all types of power transformers because it is independent of transformer voltages, transformer core type and its load.



Benefits

Enging's power transformers condition monitoring solution have several benefits, such as:

-  Monitor the availability and health of power transformers
-  Real-time remote monitoring
-  Non-Invasive technology
-  Smart Algorithm with self-learning
-  Direct analysis of electrical variables in an electrical machine
-  Detection of the potential intermittent faults
-  Allows the monitoring of dry transformers (oil-free)
-  It is not dependent on physical substances subject to contamination
-  Allows the monitoring of unwanted harmonics
-  Identify faults at unload and load conditions
-  Detect, evaluate and track the fault evolution all time
-  Simple and intuitive platform for non-expert users
-  Warning alerts and recommendations



This high-sensitivity diagnostic approach method is based on the latest innovative techniques with smart algorithms to monitor electrical assets' health. That allows fault diagnosis and asset condition monitoring and management.



Applications

Enging's transformer condition monitoring solution can be applied to any power transformer in an industrial installation, power plant or substation:



Set-Up Transformers

Power plants (Hydro, Thermal, Nuclear, Co-generation, Gas, Renewables)



Power Transformers

Primary Substations



Distribution Transformers

Secondary substations



Industrial Installations

Transformers

Main faults detected



Faults in windings



Faults in the core



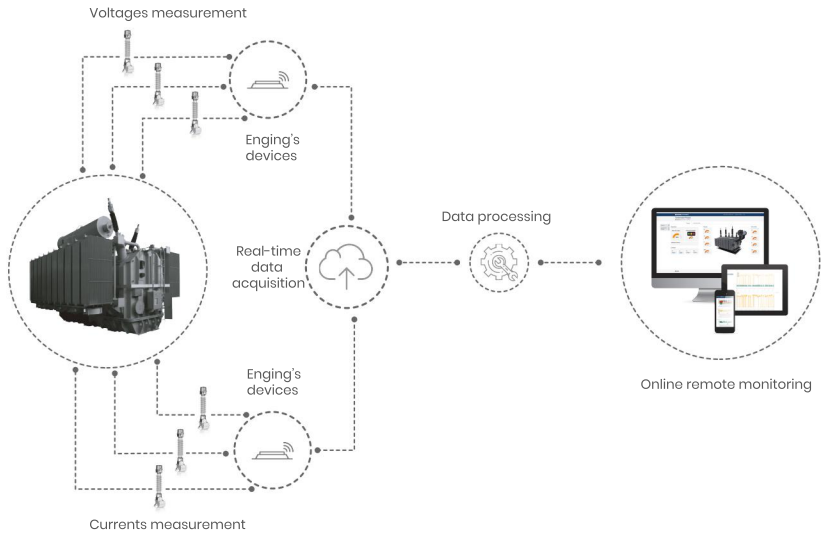
Faults in On-Load Tap-Changers



Installation

Enging devices only need to get access to the secondary signal of current transformers (CTs) and voltage transformers (VTs) already available in the substation, from the primary and secondary side, in order to acquire all the power transformer's voltage and current signals (primary and secondary side).

These signals are processed locally by a dedicated data acquisition and processing device, in order to compute in real-time, the internal power transformer operating state parameters.

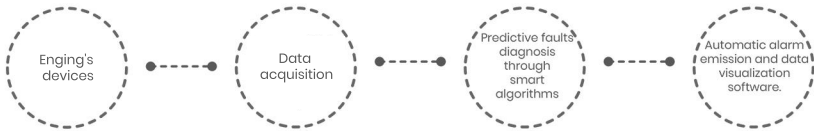


During an initial commission period, the processing device calculates and stores all the transformers parameters according to its operating profile. Then, the system enters in diagnostic mode where all parameters are calculated and compared with the stored values. Fault diagnosis is performed when deviations from the reference values appear. The processed signals and diagnosis results are sent to a central dedicated software and database installed in a remote server to allow to the operators visualize, in real-time and remotely, the condition of an extended park of these assets.

An highly innovative software for any computer system, capable to provide information about different variables related to the operation of electrical motors and power transformers, through an intelligent diagnosis based on the electrical analysis of voltage and current signals.

Benefits

1. Real-time data visualization
2. Historical data
3. Trend analysis
4. Automatic alarms emission due to incipient faults
5. Data load and download
6. Detailed information about the operational conditions of assets
7. Equipment configuration
8. Events and alarms visualization



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Additional Features

Enging's solution presents additional features, such as:

- Easy correlation between network failures and events
- Identifies the fault component
- Robustness to the grid disturbances
- Robustness to the grid and load unbalances
- Independent of the load level
- Independent of the current transformer accuracy
- Could work as a standalone unit
- Independent of transformer age or core geometry
- Data visualization with a dedicated software:



Electrical
Measurements



Load Level
Profile



Tap Changer
Position



Data Load
and download



Management of all devices
connected in one place



Asset
Database



Historical and
trend analysis



Alarms
history



Maintenance
Recommendations

Optional Features:

- Evaluation of the energy quality through parameters such as active, reactive powers, power factor, harmonic distortion, voltage and current imbalances;
- Thermal model of the transformer;
- Data integration of others instruments (eg. DGA, Temperature probes)



ENGING

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"Enging is committed to making a difference to its customers by its quality, efficiency and professionalism, being a reliable partner for solving its problems through engineering solutions."

– CEO

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