

Quick Info

Installation of transformer at altitudes above 1000m will reduce the BIL level of the transformer. New design require for high altitudes installation



Next Issue



Failure of Power Transformer

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ENVIRONMENTAL FRIENDLY IN POWER TRANSFORMER DESIGN

To meet today's increased demand on environmental friendly solution, power utilities and their partners are progressively developing technology that can improve the efficiency and safety operation of power transformer.

With the future generation and distribution of energy are towards smart grid and greener technology, the used of eco-friendly transformer plays a major key role. The 3E concept; eco-friendly, efficient and economical nowadays are the ultimate goals in designing and manufacturing the new transformer. The greener transformer should be assembled using material that can reduce impact on natural resource availability. For the long sustainable operation, it must be designed for lower maintenance cost as well as with more energy-efficient operation and lower loss rates. Finally, eco-friendly transformer should last longer and when reach their end-of-life, they're easier to recycle than ordinary transformer.



IMPORTANT ASPECTS OF ECO-FRIENDLY TRANSFORMER

Through a number of innovations, a sustainable and eco-friendly transformer has provide key benefits to end consumer. Several design hallmarks of eco-efficient transformer include of:

Cleaner Manufacturing and Environment

The eco-friendly transformer are designed and manufactured from greener resources. The used of biodegradable and non-toxic material reduce pollution during manufacturing, operation and after the transformer are retired. The ester insulating fluid

Reduced risk of environment pollution through biodegradable and non-toxic insulating fluid

manufactured from vegetables based resources are biodegradable and reduce risk of environmental pollution in the case of transformer leaks or explosion due to fire incident. Nowadays, the green insulating oil such as BioTemp (ABB), FR3 (Cargill), Midel are increasingly and extensively used in power transformer worldwide. The extensive research done by universities and power utilities demonstrated the effectiveness of these bio-based oil in providing sustainable environmental protection.



Other than bio-degradable insulating oil, the used of dry type transformer also provide an option for cleaner manufacturing and green environment. Since the oil filled transformers are prone to safety related issues due to lower fire point and oil leakage, dry type transformers eliminates leaks and spills, hence, eco-friendly in nature. In addition, the transformers are easily to be handling after completion of their lifecycle.



- Advantages of dry type transformer:**
- Provide safety for property and people
 - Environment friendly product
 - No fire hazard
 - Less maintenance

Increase Safety

With high flash point characteristic, the eco-friendly transformer provide higher fire safety level, offering increased security not only for the operators but also for those in close proximity. The fire point above 350oC, more than twice of mineral oil, the transformer are less flammable and reduce fire spreading.

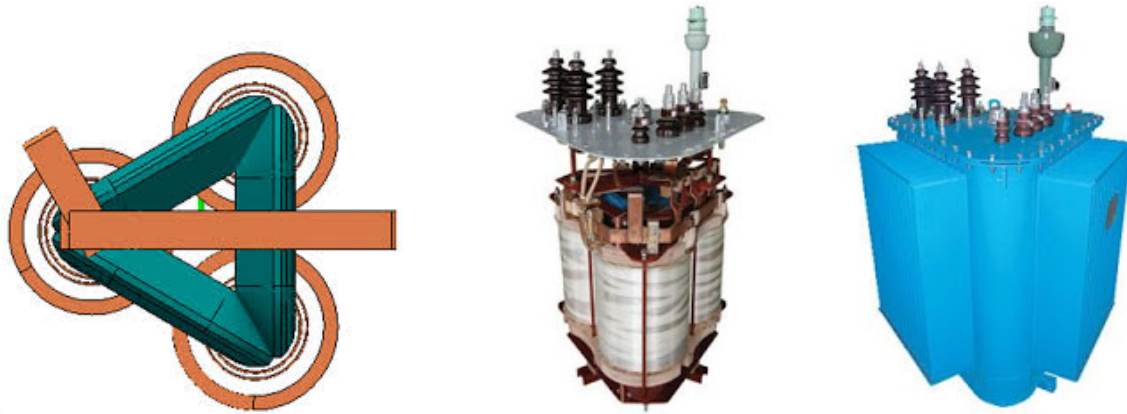


Transformer Explosion :
Eco-transformer reduced risk of fire by providing higher fire safety level

Quieter Operation

Through innovative solutions, the acoustic energy produced during transformer operation has been considerably reduced. Typically, the transformer hum is characterised by magnetostriction of the core steel material, cooling equipment noise and load noise generated by the electromagnetic forces that result from the interaction of the load current in the windings and the leakage flux produced by this current. Recent new transformer design based on triangular wound

cores have been attracting attention. This revolution combined three single wound core frames with the same size to form a 3D triangle transformer compared to the traditional plane core transformer. The new transformer design has provided several advantages including low noise which is attractive for operation in sensitive areas. The compact and symmetric configuration of both the core geometry and the excitation of the winding allows the stray field of different phases to cancel and decay closer to the triangular unit than for a bilaterally symmetric planar transformer.



Design of 3D wound core transformer

Longer Lifecycle

The used of an advanced material in manufacturing process has allowed the power transformer running reliably longer duration. That means a substantially greater return on investment and far less material waste over time. For instance, the thermal upgraded paper for winding insulation may last double than of standard kraft paper insulation and synthetic paper insulation may last five to eight times longer.



Thermal upgraded insulation:
Extend the service life of transformer

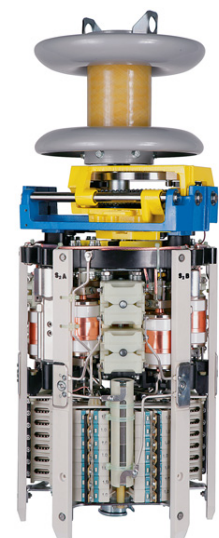
The extended of transformer lifecycle can also be achieved through effective maintenance program such as prolong the maintenance activities using modern technologies. New generation of tap changer uses vacuum interrupter technology allows the arcs during load commutations to occur in vacuum interrupters and not in the tap changer oil. This greatly reduces the operational cost by extending maintenance cycle from 150,000 to 300,000 switching operation, no oil carbonisation and creates the potential for using environmentally friendly insulating fluids.



tungsten copper arcing contact

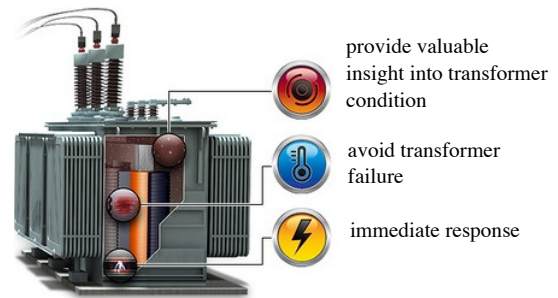


vacuum interrupter



New load tap changer design:
Prolong maintenance interval up to 300,000 switching operation

The transition into Industrial Revolution (IR4.0) where online and connected technologies becoming norm also has changed the operation and management of power transformers. Through Internet of Things (IoT) facilitated by online remote monitoring functionality, it has enabling issues to be identified in advance and helping to prevent operation downtime caused by transformer breakdown. As such, the full digitalisation of transformer increases efficiency by turning data into actionable intelligence for optimised asset performance and utilisation, avoid unplanned outages with early warnings and prevention of failure and improve safety through minimising human exposure to substation environment.



Transformer digitalisation:
Provide cost effectiveness and improve safety

KEY DRIVERS IN ECO-FRIENDLY TRANSFORMER

The development of technologies that can help in accomplishing the environmental targets has improve the usage of eco-friendly products globally including eco-friendly transformers.

Key Drivers and Restraints of Global Green Power Transformer Market

- Rise in industrialisation and urbanisation across the globe is estimated to be a key driver of the green power transformers market. The market has been witnessing a significant increase in the demand for transformers across the world in the last few years.
- Substitution of mineral oil and SF6 based power transformer. Increasing in transformer loading and operating temperature lead to premature degradation of insulation system and reduction in transformer' life. Meanwhile, SF6 is a highly potent greenhouse gases and it is 22,800 times more potent than CO2. Eco-friendly transformers have very less impact on the environment and expected to drive the market in the near future.
- Lack of environmental awareness and absence of rules and regulations regarding the use of mineral oil and SF6 based power transformers is a key factor restraining the green power transformers market

Editor:

Ir. Dr. Mohd Aizam Talib
aizam.talib@tnb.com.my

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03-89225000