DESIGN AND ANALYSIS OF HEAT TRANSFORMER THROUGH FINS

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Abstract: *The best transformer design problem to minimize the active part cost of three phase core different distribution transformer. The transformer design process involves The optimum transformer design problem to minimize the active part cost of three phase core type distribution transformer. substantial heuristic exercise to select the design, best suited to a set of specifications. The design problem considers minimization of total cost of core and conducting An integrated, three-dimensional, finite element package for the analysis and design of power transformers is developed, requiring no prior user experience in numerical methods and magnetic field simulation. The package consists of an automated pre-processor, magneto static solver and post-processor. High accuracy, low computational cost, minimization of user interaction and functional interface are the main advantages of the software, rendering it a powerful computational tool for characteristics prediction of single and dual voltage transformers , suitable for an automated design environment. For the development of the package, a particular scalar potential formulation was adopted.*

The software has been incorporated in the design process of a transformer manufacturing industry for the evaluation of the leakage field and short-circuits impedance. The comparison of its results with measured values indicates the improvement of accuracy in comparison to the existing methodology, resulting in reduction of the design margin. Moreover, its employment has contributed to the decrease of the transformer industrial cycle and production cost.

***Key words*: extended surface, analysis, extensions, design and heat transfer enhancement, etc.**

1. INTRODUCTION

The process of electric utilities restructuring, privatization, and deregulation has created a competitive, global market place for energy. In this new and challenging environment, there is an urgent need for more efficient use of transformer materials, reduction of size and overall material costs and development of design methods that decrease the manufacturing time. On the other hand, the ability to comply with customer requirements as well as the efficiency and reliability of the produced transformers must not be compromised. Transformer efficiency is improved by reducing load and no-load losses. Transformability is improved by the accurate valuation of the leakage field. the short-circuit impedance and the resulting forces on transformer windings under short-circuit, since these enable to avoid mechanical damages and failures during short-circuit tests and power system faults. The transformer users specify a desired level of load losses, no-load losses and short-circuit impedance (specified values). It is within the transformer designer responsibilities to implement the transformer design so as the transformer to meet the specified values at the lowest cost. The transformer is designed so that its losses and short-circuit impedance (designed values)are very close to the specified ones, while a design margin is used since, in practice, transformer measured losses and short-circuit impedance deviate from the designed ones due to constructional and measurement tolerances. The transformer manufacturer guarantees the values of losses and short circuit impedance (guaranteed values), while the permissible deviations of the guaranteed values from the measured ones are specified by international standards and the transformer manufacturers are obliged to comply with them. Accurate estimation of transformer losses and short-circuit impedance during the transformer design phase is crucial, since,

- It reduces the material cost, since smaller design margin is used.
- It decreases transformer delivery time, since there is no need for transformer prototype to confirm the accuracy of transformer design.
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1.1 PROBLEM DEFINITION

In industry the transformer is common and its speciation and technical data and effectiveness change as per required so problem is occur when we increase the capacity of transformer we have to change its part size or called as geometry so stress level is change of the part so our aim to check the static and thermal analysis of fin with different section

1. Structural analysis of the transformer tank using ansys 12.0 software.

2. Thermal analysis of fins
3. Analysis of Finns
    a) Rectangular fins
    b) Trapezoidal fins
    c) At different fin spacing

1.2 METHODOLOGY

A Aim: Analysis and Optimization of Transformer Tank

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Problem Definition: Need of thermal and static analysis of Fins effective ness

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Existing problem: As per change the capacity of the transformer to change the body shape size an effectiveness

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Solution: We are going to use following solution –

1. Analytical design of"Design and Analysis of Transformer Tank".
2. Modelling and Simulation of "Design and Analysis of Transformer Tank".
3. Static analysis of "Design and Analysis of Transformer Tank".

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Analysis:-Process-wise Analysis

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Result

CONCLUSION

The use of fin with extensions, provide more heat transfer:

- Fin with extensions provide near about 5 % to 13% more enhancement of heat transfer as compare to fin without extensions.
- Heat transfer through fin with rectangular extensions higher than that of fin with other types of extensions.
- Temperature at the end of fin with rectangular extensions is minimum as compare to fin with other types of extensions.
- The effectiveness of fin with rectangular extensions is greater than other extensions.
- Choosing the minimum value of ambient fluid temperature provide the greater heat transfer rate enhancement.

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