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Design anaysis of transformer parameters using simulink

M.Keerthana, N. Deepika, E. Shanthi, Dr. G. Ramani*

Student, Nandha Engineering College (Autonomous)

*Professor, Nandha Engineering College (Autonomous)

ABSTRACT

To analyse the Parameters of core of Stationary machine by using SIMULINK. The entire program is going to be developed using Mat-Lab software. This enhance the construction of transformer core. And the output of the transformer can be analyzed. The program is developed in MATLAB software as the software is very simple to execute and output of the program can be easily made as reference for manufacturing the transformer.

INTRODUCTION

Transformers play a vital role in the transmission and distribution of generated supply. The rating of transformers varies accordingly to the need of the area where the transformer is going to be placed for the distribution. Transformer works in the principle of mutual induction. There were many projects that monitors and maintains the load flow and load balancing. Our project based on the manufacturing of the transformer. In the side of transformer manufacturing there are various software that are used for designing the transformer. The easiest way of determining the reference value of the parameter was made by using the MATLAB.

MATLAB

MATLAB (*matrix laboratory*) is a multi-paradigm numerical computing environment and proprietary programming language developed by Math Works.

MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, C#, Java, Fortran and Pyth on.

Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MiPad symbolic engine, allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi- domain simulation and model-based design for dynamic and embedded systems.

EXISTING SYSTEM

Application of overload ratings to power transformers is considered in the light of 30 years of operating experience. A comprehensive description is given of the philosophy of overloading, methods of calculation, transformer life curves, and a working computer program which incorporates these factors with increased accuracy and reduced engineering time. Recommendations are made regarding life curves, ambient temperature selection, resistance correction for temperature variations, and daily load-cycle evaluation.

The existing system calculates the cause of overloading in oil immersed power transformers. That system just calculates the overloading components and to eliminate the cause of overload.

Author for correspondence:
Nandha Engineering College (Autonomous)

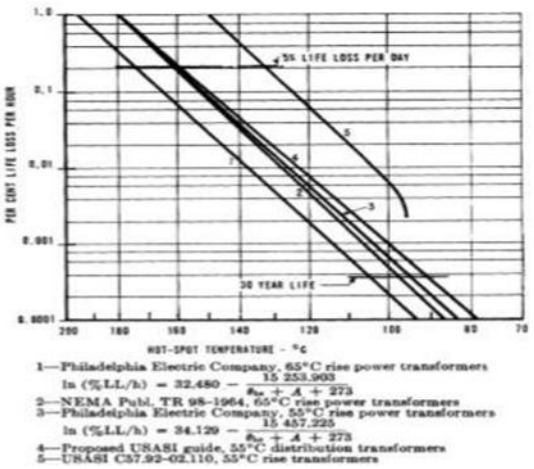


Fig [1]. percent loss of transformer life per hour of operation versus hot-spot temperature in degrees centigrade.

PROPOSED SYSTEM

Transformers are made up of metal sheets, almost always iron; they are laminated so they do not contact each other. This is done to reduce the intensity of eddy current in the core, while keeping a high flux carrying capacity. The core of the transformers are made of stacks, each stack consists of some number of metal sheets & the stack will reduce in a step wise manner. The transformer rating varies in 11Kv, 22Kv, 220Kv, etc., the stacking of core and core steps vary according to the rating of the transformer.

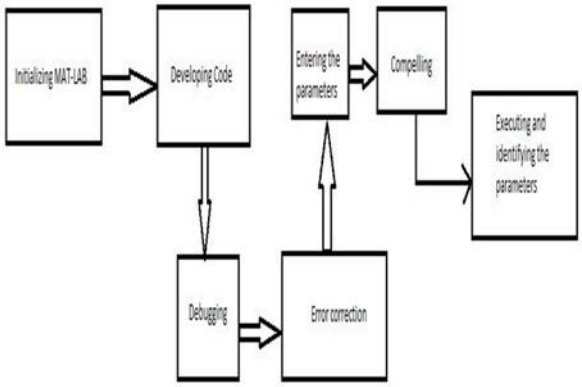


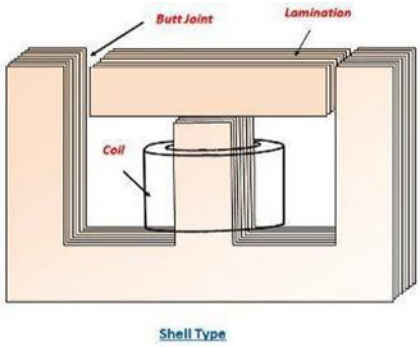
Fig [2] block diagram of proposed system

METHODOLOGY

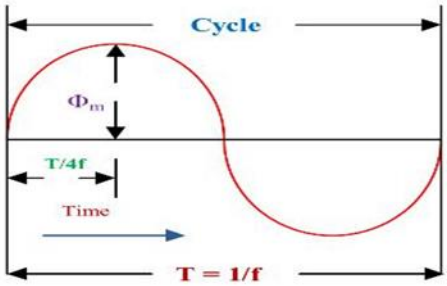
The program developed can analyze all the parameters of the transformer while leaving the ratings of the transformers. MAT-LAB, the simple tool is used for developing the program. The coding is going to developed for core section of the transformer. The flow chart for the program is developed first and the coding was made in order to design the core of the transformer.

Core designing

The shell type transformer is a simple rectangular form and the core surrounds the considerable portion of the windings which is shown in fig. Both the primary & secondary windings are placed in the one limb. And the coils are wound in from of multi-layer disc type. The different layers of the multi-layer disc are insulated from each other by paper.



E.M .F equation of transformer



E1 / *N1* = *E2* / *N2* = ***4.44 f Φm***

Voltage Transformation Ratio:-

E1 / *N1* = *E2* / *N2* = ***4.44 f Φm = K***

Constant K is known as voltage transformation ratio.

[3]If *N2* > *N1* i.e K > 1, then transformer is called step-up transformer.

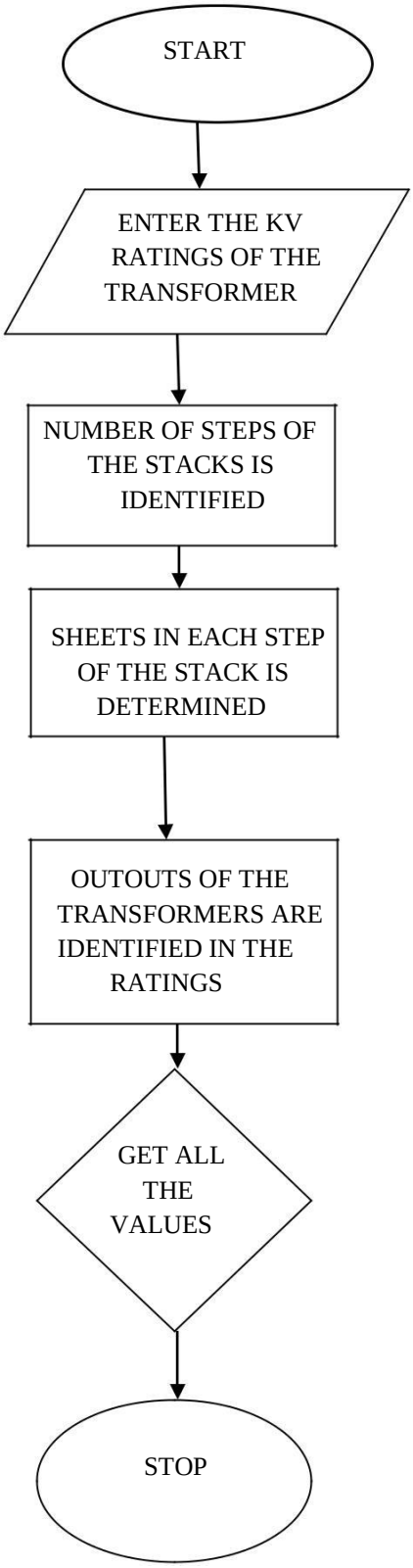
[4] If *N2* < *N1* i.e K < 1,then transformer is called step-down transform

Transformer stacking

The **stacking factor** is used in electrical transformer design. Since transformers are made up of metal sheets, almost always iron, they are laminated so they do not contact each other. This is done to reduce the intensity of eddy current losses in the core, while keeping a high flux carrying capacity. Between the metal sheets is a non-ferro-magnetic insulator, therefore, when calculating the flux density of the iron core this non-ferromagnetic material must be taken into account. The stacking factor gives an approximate number to how much of the core is effective when calculating flux.

Flux and Flux Density are related by area. The apparent area of the core is the measured area, where the lamination is included in the measurement. The effective area of the core is the area that actually affects the flux density calculation. The effective area can be found using the following relationship.

Flowchart



Aeffective=ksAapparent

The stacking factor will always be less than 1, this is because a stacking factor of 1 means that there is no laminate on the metal sheets. From this equation one can also calculate the stacking factor through algebraic manipulation given that the effective area is known.

The stacking factor is also known as the lamination factor or the space factor. The stacking factor is usually known before the actual manufacturing of the transformer since calculation after the transformer is assembled would suffer from measurement errors. Therefore, information for any particular transformer should be collected directly from the manufacturer before performing any kind of test to avoid serious damage. The stacking factor will always be less than 1, this is because a stacking factor of 1 means that there is no laminate on the metal sheets. From this equation one can also calculate the stacking factor through algebraic manipulation given that the effective area is known.

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CONSCLUSION

The analysis of stationary machine designing using Simulink were determined the ratings of the transformer and the core stacks are calculated by using the MATLAB software.

RESULT

The result of analysis the designing the transformer using the Simulink for their ratings of the transformer and the core stacks and their external parts were simulated by the MAT –LAB, by using the calculation the manufacturing of the stationary machine and their parts were calculated. The MAT-LAB is the simple and easy to show the output of the transformer hence the cost is low.

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