Abstract: This paper describe about industrial project of manufacturing, testing and improvement in the design parameters of three phase transformer. This specification covers design, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of oil immersed, naturally cooled distribution transformers for outdoor use. Currently in transformer manufacturing industry or in any industry problems are there. Any Industry wants efficient product with comparatively low cost. In this project we study the whole process of manufacturing and then to find out the problems that currently industry facing and solution for them. In transformers various tests are done to check out the losses and many other parameters. The test like open circuit test, short circuit, ratio test, impulse test, oil and winding test, insulation test, polarity test etc. This tests are done before the delivery of transformer and to check whether it giving the losses in desired limit.

Keywords: Distribution Transformer, Manufacturing, Improvement in Design Parameters, Testing.

1. Introduction
The main objective of this whole study is to manufacture and test the transformer and simultaneously find out the problems that industry facing and solution for that problems. Transformer manufacturing contain lots of processes, to study that processes deeply and working there as an employee to find out problems that industry facing. Before delivery of transformer various test are performed on it to check out the losses and various other parameters. Transformer is a device which work with 95 to 96% of efficiency. This is to be check out during the various tests. In the recent development of power systems, increase in power plant capacity has been a major achievement in the power industry, the purpose of distribution transformer is to reduce the primary voltage of the electric distribution system to the utilization voltage serving the customer.

2. Manufacturing
A. Process including in manufacture
1) Core construction
It is consist of limbs depends on the phase of transformers. The material used is CRGO steel and HRGO steel. The laminated sheets are used to reduce eddy current losses. The sheets are varnished layer on them to insulate them from each other

2) Stepped core
As round shaped winding are used in transformer construction if we used rectangular core then the lots of space remain utilized hence we usually use steeped or square core.

3) Winding
There are two types of windings we use that is high voltage and low voltage winding, we use two types of insulation for them one is paper insulation wrapped over it and one is it is already coated with insulated layer. Low voltage winding is always near to core to reduce insulation cost and the percentage of problems that can occur. High voltage winding is over the low voltage winding.

4) Transposition
Low voltage winding is transposed while wrapping it around its periphery. It increase the efficiency and various problems that can happen. It also reduce losses.
5) **Heating and Megger test**

After assembling of transformer we send it for heating in heater to remove the moisture remaining in the winding or in whole assembly of it. Megger test is carried out for checking the insulation resistance. Importantly in transformer it is carried out to check whether all insulation are proper or not.

- **Polarity test**: We check the polarity of transformer between two points.
- **Tanking**: After all the procedure of assembling and primary testing like megger test we insert the three phase distribution transformer in the tank. The transformer is made ready for testing after assembly of bushings, conservator, radiator, and all other protecting devices. After inserting the transformer we pour oil inside of it which is again filtered while pouring and the process get done.

**Table 1**

The transformers as per losses and other efficiency parameters.

<table>
<thead>
<tr>
<th>Voltage Ratio</th>
<th>Rating (kVA)</th>
<th>3 Star</th>
<th>4 Star</th>
<th>5 Star</th>
</tr>
</thead>
<tbody>
<tr>
<td>110kV/433 - 250 V</td>
<td>Max. Losses at 50% loading (Watts)</td>
<td>Max. Losses at 100% loading (Watts)</td>
<td>Max. Losses at 50% loading (Watts)</td>
<td>Max. Losses at 100% loading (Watts)</td>
</tr>
<tr>
<td>110kV/433 - 250 V</td>
<td>16</td>
<td>150</td>
<td>200</td>
<td>120</td>
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<tr>
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<tr>
<td>110kV/433 - 250 V</td>
<td>20</td>
<td>150</td>
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</tbody>
</table>

4. **Problems we found and solution for them**

- **Problem**: Mechanical tap changers that are used currently in transformer industry creates problems like arcing between taps which leads to carbonization and degradation of transformer oil. It also leads to various losses and machine life will get reduced. This increases maintenance cost.
- **Solution**: To tackle this problems solid state tap changer can be used over here. All the losses that are happening because of mechanical tap changer are overcome by solid state tap changer.

5. **Conclusion**

Hence we studied the whole process of manufacturing of transformer and testing of it. While studying in industry we got the problem that currently industry facing and we gave solution to that problem.

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