

A Report on the Industrial Visit to S.V.R Electricals, Guntur

Proforma of Report:

- Background
- Introduction to S.V.R Electricals
- Divulgence of the visit
- Recapitulation
- Students Opinion
- Vote of Thanks

Event date: 24 – March - 2014

Background: After concrete efforts of our Management, the students of K.L.University IEEE Student Branch secured this esteemed opportunity to have an Industrial visit to a prestigious company like S.V.R Electricals Ltd. We appreciate the efforts of the management of K.L.U for ameliorating to execute this successful Industrial trip.

Introduction to S.V.R Electricals: S.V.R Electricals is one of the most reputed Transformer Manufacturing Company in Costal Andhra Pradesh famous for their Distribution transformers manufacture and also as a manufacturer of wide range of transformers, which conform to the quality expectations of both domestic and state market. The company is an ISO 9001:2008 certified company manufacturing voracious transformers of sustainable ratings. The company is managed by technocrats, is engaged in manufacturing Power, Distribution & Special application type of transformers. The company has a large customer base and well equipped machinery for construction and possesses a well furnished storage area. Different testing methods and shielding machinery have been equipped in the company to ensure perfect and secured construction of Transformer Core and Transformer Oil. The company has won the faith of customers and proving the quality management techniques followed and securing esteemed results in the supplied products.

Divulgence of the Visit:

Transformer construction involves the following steps:

- i. Construction of Winding
- ii. Construction of Core
- iii. Core Assembly
- iv. Tanking and Oil filling
- v. Testing

Construction of Winding: Closed-core transformers are constructed in "core form" or "shell form". When windings surround the core, the transformer is core form; when windings are surrounded by the core, the transformer is shell form. Shell form design may be more prevalent than core form design for distribution transformer applications due to the relative ease in stacking the core around winding coils. Both High Voltage (HV) and Low Voltage (LV) windings are done by using coil winding machines. The copper or Aluminium strips/wires used in winding are meticulously selected for its quality to give the best output. The copper (Cu) or Aluminium (Al) strips/wires are generally used as windings in high rating and low rating transformers respectively. The paper cover acts as Insulator. This helps to increase short-circuit strength, thermal strength and higher efficiency.



Construction of Core: The Cold Rolled Grain Oriented (CRGO) laminations used in transformers are of high quality. They are in the form of thin sheets and they are cut as per the design varying for different capacities of transformers. Highly skilled people assemble the laminations on a core channel to form core. These are perfectly assembled without any gaps to avoid energy loss. Each lamination is insulated from its neighbors by a thin non-conducting layer of insulation.



Core Assembly: The wound coils are placed carefully in the assembled core. Insulations are given whenever required using different insulation materials such as like press boards. The primary and secondary windings are mounted as per the requirements of the rating. The assembly is then transferred to the Hot Air Chamber and a high temperature is maintained to prevent any moisture in the Core of the transformer and the coil assembly also.



Tanking and Oil filling: MS plates of extra quality are used in fabricating the tank. The assembly job is now carefully places inside the tank. The bushings, tap switch drive circuit and plug sockets are then fitted on the tank. The oil is first filtered to remove the tinges of moisture by heating the oil to 80°C. Then oil is filled and cover is placed on the tank frame and bolted.

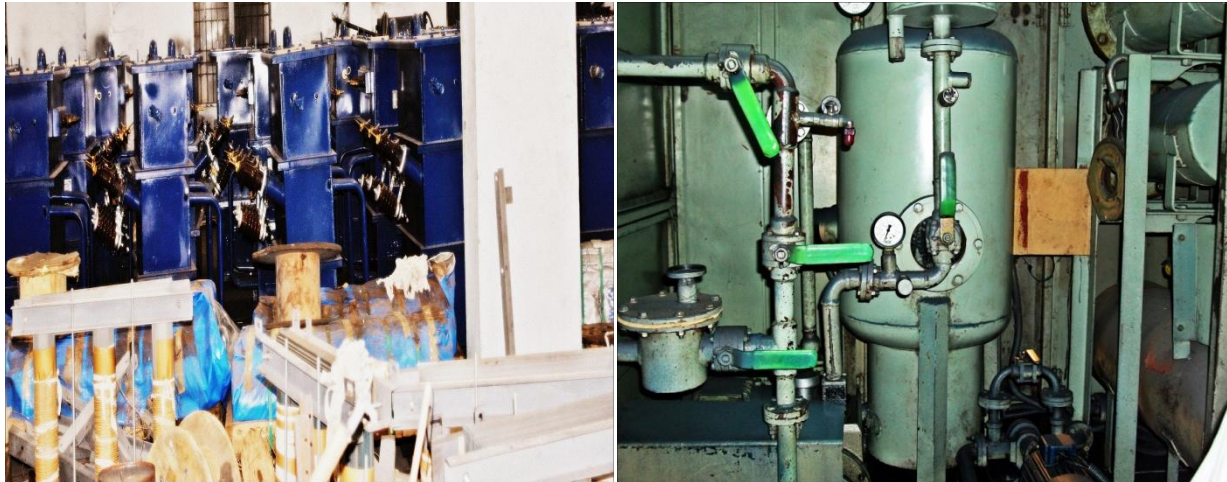


Testing: The transformers are individually tested and 9 tests are conducted on these transformers.

- **Open Circuit Test:** As the name suggests, the secondary is kept open circuited and nominal value of the input voltage is applied to the primary winding and the input current and power are measured. The no load current at rated voltage is less than 1 percent of nominal current and hence the loss and drop that take place in primary impedance $R + jX_l$ due to the no load current I_0 is negligible. The active component I_c of the no load current I_0 represents the core losses and reactive current I_m is the current needed for the magnetization.
- **Short Circuit Test:** The purpose of this test is to determine the series branch parameters of the equivalent circuit. As the name suggests, in this test primary applied voltage, the current and power input are measured keeping the secondary terminals short circuited. W_{sc} is the sum of the copper losses in primary and secondary put together. The reactive power consumed is that absorbed by the leakage reactance of the two windings.
- **High Voltage Test:** High voltage testing can be broadly classified into testing of insulating materials (samples of dielectrics) and tests on completed equipment.
- **Insulation Test:** Here the insulation of the core and the transformer insulation are tested. Insulation test is highly essential for us to protect the operand from the external shocks and risks. The insulation test (also called high resistance test) is always made DC. The insulation test is combined with a short-circuit test and high voltage test in DC. Measurement of dielectrical strength and detection of short circuits is made here.
- **Double Frequency Double Voltage Test:** It is used to find the insulation break down of the conductors from turns to turns and layers to layers. This even helps to attain proper rating and precession values are accurately measured in this test.
- **Resistance Test:** Resistance is measured here and this is essential to the maintenance of the transformer rating. This is done by applying a small d.c voltage to the windings of the transformers and measuring the current through the same. Impedance can be obtained by applying a.c. This is essential for skin effect corrections.
- **Heat Run Test:** This test is made to determine the temperature rise of the transformer under rated Load. This is similar to that of back to back test which can be conducted on the transformers. Here Δ - Δ connection is followed. During the testing of the transformer,

Secondary is connected in open Δ . This test is continued until the transformer winding and oil reach the steady state temperature.

- **Break-Down Voltage test:** The dielectric break down voltage test is an important test to determine the withstanding capacity of any insulation oil or liquid. There is a degradation of transformer oils or ingress of moisture and it is necessary to test the insulating oils periodically. BDV test is one of the most common tests done on all Insulating fluids, but very critical one.



Recapitulation: All the Student Members of IEEE has well participated and secured knowledge on Transformer construction techniques and procedure involved in transformer construction. Various methods of testing the Transformers are known and methods are noted. Information on testing the transformers is encapsulated.

The student members are divided into 3 teams and well experienced engineers are allotted to each group. Hands-on sessions are done by students. Transformer Oil testing and Oil purifying techniques are taught.

Insulation materials are well shown and different mechanisms for winding the coils are acknowledged. These methods are also manually implemented and practiced.

Various ratings of transformers and their construction techniques are acclaimed by the students.

Different kinds of Bushings employed and functioning of lightening arrestors and bushings on the transformer are prominently renowned. These manufacturing and illustration mechanisms help students to get well acknowledged with physical knowledge on transformers.

Students Opinion:

K.L.University has helped us to secure necessary training sessions and procure sufficient knowledge on transformer construction. They helped us have a practical exposure on the technical topics taught in our regular lecturers. The company trainers are successful enough to balance between technical excellence and industrial duty. It was great experience to know the industry internally.

- K. Vamsi Krishna

It was my first Industrial visit to any manufacturing plant and enjoyed every bit of it. To be a part of such an esteemed organization and having a look through all their process was an intriguing experience after all.

- V. Rohit Kumar

Visit to a Transformer manufacturing company is an eye-opener. We secured basic knowledge and prime requirement on the transformers and their internal paraphrasing. It's our esteemed chance to think and learn beyond the education. We thank IEEE Student branch to give us this opportunity.

- K. Harsha



Vote of Thanks: On behalf of all the Management and the students we take this opportunity to thank the entire team of S.V.R Electricals for providing us with the practical information and well as wonderful hospitality. We take moment to offer our greetings to the entire S.V.R Electricals team.

Yugesh Y
Secretary IEEE
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