



# NEW HORIZON COLLEGE OF ENGINEERING

New Horizon Knowledge Park, Ring Road, Marathalli  
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC  
Accredited by NAAC with 'A' Grade, Accredited by NBA

## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

### INDUSTRIAL VISIT

**MODE OF CONDUCTION:** OFFLINE

**DATE:** 27/11/2021

**VENUE:** RAJAMANE & HEGDE SERVICES PVT. LTD



## **OBJECTIVE:**

The main purpose of this Industrial visit was to bring familiarity with Motor and generators practically.

## **INTRODUCTION:**

The students of 5<sup>th</sup> semester 'A' section of EEE Department visited the Rajamane & Hegde Services Pvt. Ltd, KIADB Industrial Area, Antharasanahalli, Tumkur – 572106. The visit began at 8:30 AM and ended at 4:00 PM.

Our group was divided into two teams of sixteen members, and each team were handled by our Professors and Production Engineers.



We started to explore the industry and ask questions about the motors and generators, and interact with the engineer and our teachers which was very interesting. The motors and generators there were very huge with greater ratings and power capacity. The whole session was very informative and we wanted some more time to get to know more about those machines in live.



## **EXPERIENCE:**

This was an interactive session where we were asked to observe how the windings are insulated, and connected to the rotor and stator windings of the motor and generators. Here we also came across how the coils are individually insulated by insulating papers.



Insulating papers being made to small pieces



Copper coil windings being insulated by insulating papers



Copper conductors cut into pieces



Copper coil shaping unit



Copper coil after being shaped



Coil assembled to Rotor

As seen in the above pictures the bare copper wire is insulated in enamel and then they are made a group of five and covered by insulation paper. The insulated copper coil is then sent to the shaping unit to get them in lap and wave arrangement. These lap and wave shaped coils are assembled into the rotor of the motor or generator.





DC Rotor



Squirrel cage and Slip ring IM



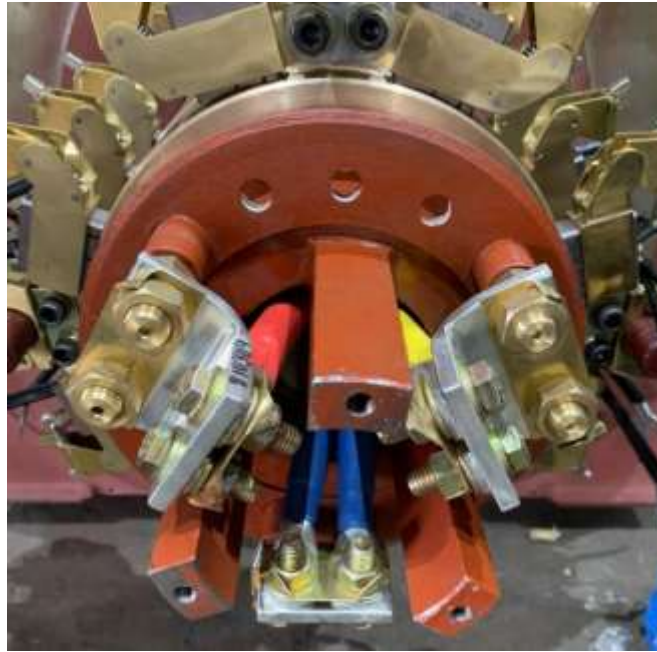
Copper coils being wound to the rotor

In the above picture we can see the rotor conductor paced in to the rotor slots. We can also see the squirrel cage motor whose rotor bars are shorted and also slip ring wound rotor whose slips are shorted. We can also see the Commutators which converts AC signal to DC signal. Mice is present in between insulation of Commutators. Air circulation gaps are present in slip ring rotor.



We also got an opportunity to see the constructional details of the motor as seen in the above pictures. The slip rings and carbon brushes are placed on the shaft as we can see clearly and the terminal wires of the motor are visible. They also use magnetic compass to check the number of poles in the stator part of the motor. Exciter for excitation is being used here and RYB is connected the the excitation.





R/Y/B connection



Image of stator body being assembled

The conductors are cut into many slots which are known as Laminated slots and they are used to decrease Eddy current losses because we know that resistance is inversely proportional to area hence if area decreases the resistance increases and the current decreases and hence the losses are minimized. The slots are made up of silicon steel which are of 0.5mm thickness.



Stator part

The stator windings are made up of copper conductor as per the design given by ABB company depending upon the frequency. If there is a variation in the number of coils in the motor heat will be produced and it may damage the motor. The power rating 280Kv machine costs around 7 lakhs, to complete the construction of one machine it requires three days.

The stator of the machine undergoes through the below test:

- IR test.
- Service test.
- Polarity test.

The stampings used here costs more than 1000 Rs where one stamping is equal to 0.5 mm thickness for cleat, which is used for locking of stator core.

To avoid the moisture content in the stator winding they are sent to pre heating ovens where the temperature is set to 120°. This process is known as Pre-heating.

Vaccum is used to harden the conductors of the stator winding. Varnish is applied to the stator winding which is again sent to oven for heating up to 250°.

After the heating to harden the varnish applied to the stator winding. The stator winding is painted in red paint to avoid moisture. The red paint is a jell cote known as doctor beck. Thinner is added to the jell cote paint in the proportion of one is to ten (1:10).



## ***Rajamane & Hegde Services Pvt. Ltd:***



Inside view of Rotor assembling unit of the industry

The Rajamane & Hegde Services Pvt. Ltd is a manufacturer of coolant pumps, electric motors, refueling pumps and auto electric parts since 1975. Whose annual turnover is from Rs 25cr to 50cr.

Most of the workers in this industry are ITI electricians. Here they use heating ovens which has a heating capacity up to 250° which contains hot air circulating fans to reduce pressure inside the ovens. The cranes in the stator unit have a capacity to carry up to 3000kg (single metal bar crane) and 5000kg (dual metal bar crane) made us of MS steel. The company manufactures 280kw machine which costs around 7lakhs, also rotors which costs around 3crores, etc. In the rotor unit there is 48 tons high-capacity cranes. They also supply 35 mega watt rotors to Brazil. Cranes of 50 tons capacity has sirens for safety purpose. They also supply copper coils to Toshiba company. For rust proof maintenance they use Hydraulic oil for rotor stampings.

## **OUTCOME:**

At the end of our Industrial visit, we were able to know how the copper coils are insulated and are shaped into lap and wave windings, how they are wound around the rotor and stator part of the motors and generators. We also got to know the mechanical properties like weight, height and strength of motors and generators. We have an idea about the whole construction and working of motors and generators.

## **CONCLUSION:**

This event was organized successfully with the support of our faculty coordinators, Mr. Vinod Kumar.S and Dr. Guna Priya

Towards the end, we were satisfied about the knowledge and experience we gained in the field of motor and generator machines.

Overall, it was a fun learning experience for us students of EEE Department, 5<sup>th</sup> Sem, 'A' section.



**Report by**



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**V Sem A section/EEE**