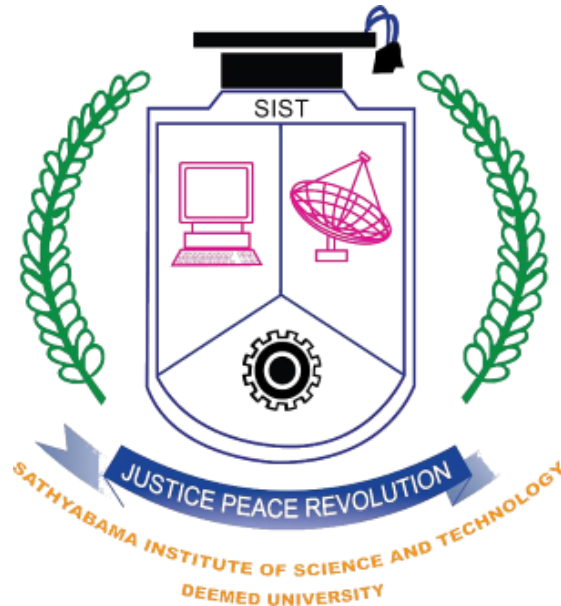


Report On 6 Days Internship On “Power Generation and Distribution to Various Parts of the Cement Plant” in RAMCO Cements Pvt. Ltd.

Submitted in partial fulfilment of the requirements for the completion of
PROFESSIONAL TRAINING

By

Periyar Selvan N (41140062)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with grade “A++” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119

OCTOBER 2023



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Department of Electrical and Electronics Engineering

Bonafide Certificate

This is to certify that this Report is the bonafide work of **Periyar Selvan N (41140062)** who carried out the internship entitled “**Power Generation and Distribution to Various Parts of the Cement Plant**” under my supervision from 06-06- 2023 to 12-06-2023.

Head of the Department

(DR.S.RADHIKA)

Submitted for Viya voce Examination held on _____

INTERNAL EXAMINER

(Signature)

EXTERNAL EXAMINER

(Signature)

DECLARATION

I, **Periyar Selvan N** here by declare that the Report entitled “**Power Generation and Distribution to Various Parts of the Cement Plant**” is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

DATE: 06-06-2023 to 12-06-2023

PLACE: Ariyalur


Periyar Selvan N
(Signature of the candidate)

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of SATHYABAMA for their kind encouragement in doing this Report and for completing it successfully. I am grateful to them.

I convey my thanks to DR. N. M. NANDHITHA, Prof. & Dean, School of Electrical and Electronics Engineering and DR.S.RADHIKA ,Head of the Department, Dept. of ELECTRICAL AND ELECTRONICS ENGINEERING for providing me necessary support and details at the right time during the progressive reviews.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Electrical and Electronics Engineering who were helpful in many ways for the completion of the Report.

(Name of the Candidate)

Periyar Selvan N

PREFACE

Organizations are made up of people and function through people. Without people, organizations cannot exist. The resources of men, money, material, machinery, and mechanism are connected, coordinated and utilized through people. Engineers need to concentrate more on mechanism and the way in which things have been made. The need of training arises for doing things yourself, understanding its way.

Practical exposure for doing things makes a person conversant to the technicalities involved in any job. In view of such benefits, imparting of vocational training has been made an integral part of any academic structure.

During the 6 days internship at Ramco Cements Private Limited, I visited various power generation and distribution plants in the industry. I related the concepts which I have learnt in my academics. The campus had a thermal power plant and I was explained about the working. I gained relevant knowledge which will help me in my academic journey.

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LIST OF SYMBOLS AND ABBEREVIATIONS

MRSS	– Main Receiving Substation
DGSS	– Diesel Generator Substation
HFO	– High Fuel Oil
LDB	– Lighting Distribution Board
APFC	– Automatic Power Factor Control
ETU	– Electronic Tripping Unit
XLPE	– Cross linked Poly-Ethylene
RMSS	– Raw Mill Substation
FC & FCBC	– Float & Float cum Boost Charger
VRLA	– Valve Regulated Lead Acid
SPRS	– Slip Power Recovery System
CMSS	– Cement Mill Substation
MW	– Mega Watt
KVA	– Kilo Voltage Ampere (Power rating)
STG	– Steam Turbine Generator
LT / LV	– Low Tension / Low Voltage
HT / HV	– High Tension / High Voltage
CT	– Current Transformer
OLTC	– On Load Tap Changer

Chapter 1. Introduction

1.1 Company Introduction:

The Ramco Cements Limited (formerly Madras Cements Limited) is a part of the Ramco Group with headquarters in Chennai, India. Ramco Cements has 5 Integrated Cement manufacturing units, 6 grinding units, and 1 Packing terminal across India. The company also produces Ready-Mix Concrete(RMC) and Dry Mortar products. The company has a Research Centre (Ramco Research & Development Centre) in Chennai and operates wind farms in Tamil Nadu and Karnataka. Ramco Cements was established as Madras Cements in 1961 by Shri. P.A.C. Ramasamy Raja, an industrialist and the founder of Ramco Group of Companies. The first plant commenced operation at Ramasamy Raja Nagar Plant, Aruppukkottai, Virudhunagar District, Tamil Nadu. They are the first to adopt dry process kiln technology and vertical roller mills which help in energy efficiency.

1.2 Nature of work done in the company:

Ramco Cements offers a comprehensive range of products and services designed to meet the diverse construction requirements at various project stages. Their commitment to quality and customer satisfaction is reflected in their product offerings, which provide durability and convenience throughout the construction process. The company's main product is Portland cement, manufactured in eleven production facilities that include Integrated Cement plants and Grinding units with a current total production capacity of 21 MTPA. Ramco Cements opened its first wind farm at Muppandal in 1993. In 1995, Ramco Cements installed 69 additional windmills at Poolavadi near Coimbatore. As of 2019, the total installed windmill capacity is 165.785 MW with 235 individual units.

Chapter 2. Knowledge acquired

2.1 Internship Description:

I was given the opportunity to do internship in Ramco Cements Limited plant located in Ariyalur district for 6 days. I was allocated to Electrical department in the cement plant, which has a total of four substations. They are Main Receiving and Diesel Generator Substation, Thermal powerplant, Cement Mill Substation, Raw Mill Substation. I learned about the power flow and power distribution of the whole plant with the help of single line diagram which was available at each substation. The components and working of many electrical machines were explained by the employees working in the plant. I was also allowed to study about the machines which are under maintenance by approaching it. I have visited various sections each day so that all of them can be covered at the allocated time. I was always accompanied by an employee with me so that I can clear my doubts and get more vivid understanding of the concepts. I was giving the safety wear, helmet and protected shoes such that ensuring my safety before entering the plant premises. I was also instructed about the Do's and Don'ts before starting my internship regarding safety measures.

2.2 Safety Measures and Precautions

- **Understanding the Equipment:** During my internship, I was taught the importance of knowing the equipment inside out. This means understanding things like Single Line Diagrams and the power ratings of the various machines. Knowing the equipment well reduces the chances of accidents.
- **Safety Gear:** Safety gear was a big part of the safety measures. This included wearing helmets, safety glasses, gloves, and other protective gear when necessary. The gear is there to keep us safe from electrical and other risks.

- **Electrical Safety:** At the power plant, electrical safety was a top priority. I learned how to safely handle equipment like Vacuum circuit breakers and SF6 circuit breakers. This was crucial for working around high-voltage components.
- **Fire Safety:** I was taught about fire safety, which included knowing how to use High Pressure Water Sprinkler Systems to control fires. Understanding what to do in case of a fire emergency, including using fire extinguishers, was emphasized.
- **Emergency Response:** Knowing how to respond to emergencies was crucial. This included shutting down equipment safely during emergencies and being aware of emergency exit locations.
- **Chemical Safety:** In some areas of the plant, chemicals were used. I learned how to handle, store, and dispose of these chemicals safely.
- **Machine Safety:** Working with heavy machinery required strict safety procedures. This included using lockout/tagout procedures to ensure machines were safely turned off during maintenance.
- **Environmental Safety:** I was taught about systems in place to reduce pollution, like Electrostatic Precipitators, and how they contribute to environmental safety.
- **Electrical Testing and Measurement Safety:** Understanding things like CT ratio and using devices like Micom-P442 relay came with safety practices when working with electricity.
- **Safe Working Heights:** For tasks at heights, I learned about fall protection measures like harnesses and safety nets.
- **First Aid and Medical Assistance:** I was trained in basic first aid and knew where to find medical assistance if needed.
- **Regular Inspections and Maintenance:** I understood the importance of regularly inspecting and maintaining equipment and safety systems.

Chapter 3. Overview of Internship Experience

3.1) Day 1 (6th June):

I was made familiar with the plant and the employees working there. I was allotted to Main Receiving Substation (MRSS) in the morning. I took note of the Single Line Diagram of the plant and their power rating. I was explained about the use of Vacuum circuit breakers for High voltage appliances.



Fig. 3.1.a

In the afternoon I visited the switchyard and the employee explained about the process of getting power supply from EB. In the MRSS 110KV is stepped down to 6.6KV and is distributed. SF6 circuit breaker is used in the 110KV line between the primary side of the transformer and the EB side. After I was taken to the Diesel Generator Substation (DGSS) and was made aware of the machines in it. The DGSS has 1 No. 4MW and 2 No. 5MW V12 Diesel generator coupled with an alternator. While the 5MW DG generates 6.6KV, the 4MW DG produces 3.3KV which is then stepped up to 6.6KV.



Fig. 3.1.b

3.2) Day 2 (7th June):

In the morning I learnt about the types of alarms and trip warnings in the transformer circuit breaker. There are two transformers which step down 11KV to 6.6KV with each having an OLTC transformer with it. Learnt about CT ratio and its uses. Both transformers have High Pressure Water Sprinkler System to contain fire. Micom-P442 relay can also be used to find the area of fault occurring which are divided into zones in the outgoing distribution line.



Fig. 3.2.a

Only the MRSS the transformers in the MRSS have (OLTC) transformer, other transformers are off load tap changers. In the afternoon I visited CRUSHER substation, most of machines require 6.6KV so Vacuum circuit breakers are used here, it is stepped down to 415V and for these machines Air Circuit Breakers are used. Air circuit breakers costs less compared to Vacuum circuit breakers. HT capacitors are used for HT side (6.6KV) while LT capacitors are used for the LT side (415V).

3.3) Day 3 (8th June):

Thermal Power Plant (TPP) has two Steam Turbine Generator (STG) with 1 No. 20MW and 1 No. 40MW. Coal is transported to the coal mill and is powdered into fine particles known as pulverized coal. This coal is used as a fuel to heat up the water in the boiler, the steam generated in this process is then used to run the turbine and hence this way power is generated.



Fig. 3.3.a

Usually only the 40 MW STG is used because the daily consumption of the load connected to TPP doesn't exceed 40MW. The output of 20MW STG is 25000 KVA with its limiting speed being 1800 RPM weighing 52340 KG. Electrostatic Precipitator is used as a filter to reduce pollution before



Fig. 3.3.b

emitting it in the atmosphere. The end product water is cooled and is re-used to avoid wastage. The water is cooled using Air Cooled Condenser Fans.

3.4) Day 4 (9th June):

There are two cement mills in the plant, so each cement mill has a Cement Mill Substation (CMSS). CMSS-1 has its power supplied from MRSS bus and CMSS from TPP. Studied the components in the Circuit Breakers and the meaning behind the wire tags, these parameters are taken from the Current Transformer and Potential Transformer. Circuit breakers have Arc chute to contain arcs and preventing it from damaging other components.

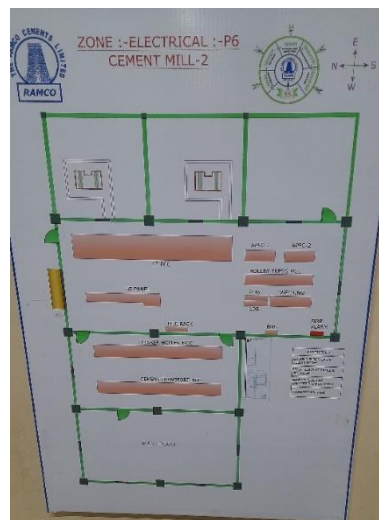


Fig. 3.4.a

The CMSS-1 has Valve Regulated Lead Acid (VRLA) batteries to act as a backup. VRLA batteries have extremely low gas and acid output hence are preferred. The batteries are charged using Float & Float cum Boost Charger (FC & FCBC). Float charger slowly charges the battery to maintain the terminal voltage while boost charger quickly charges the battery. Slip Power Recovery System (SPRS) Transformer is used to vary the speed of Slip ring Induction Motor.

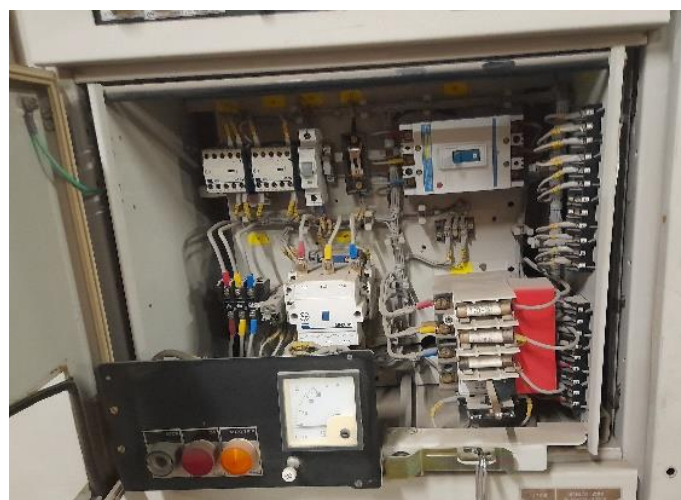


Fig. 3.4.b

3.5) Day 5 (10th June):

There are two Raw Mills in the plant with each having one Raw Mill Substation (RMSS). The distribution of power was understood using the Distribution board in the substation. H.T circuit breaker used in this substation is of HWX type with the operating voltage of 11KV and current 1250A.

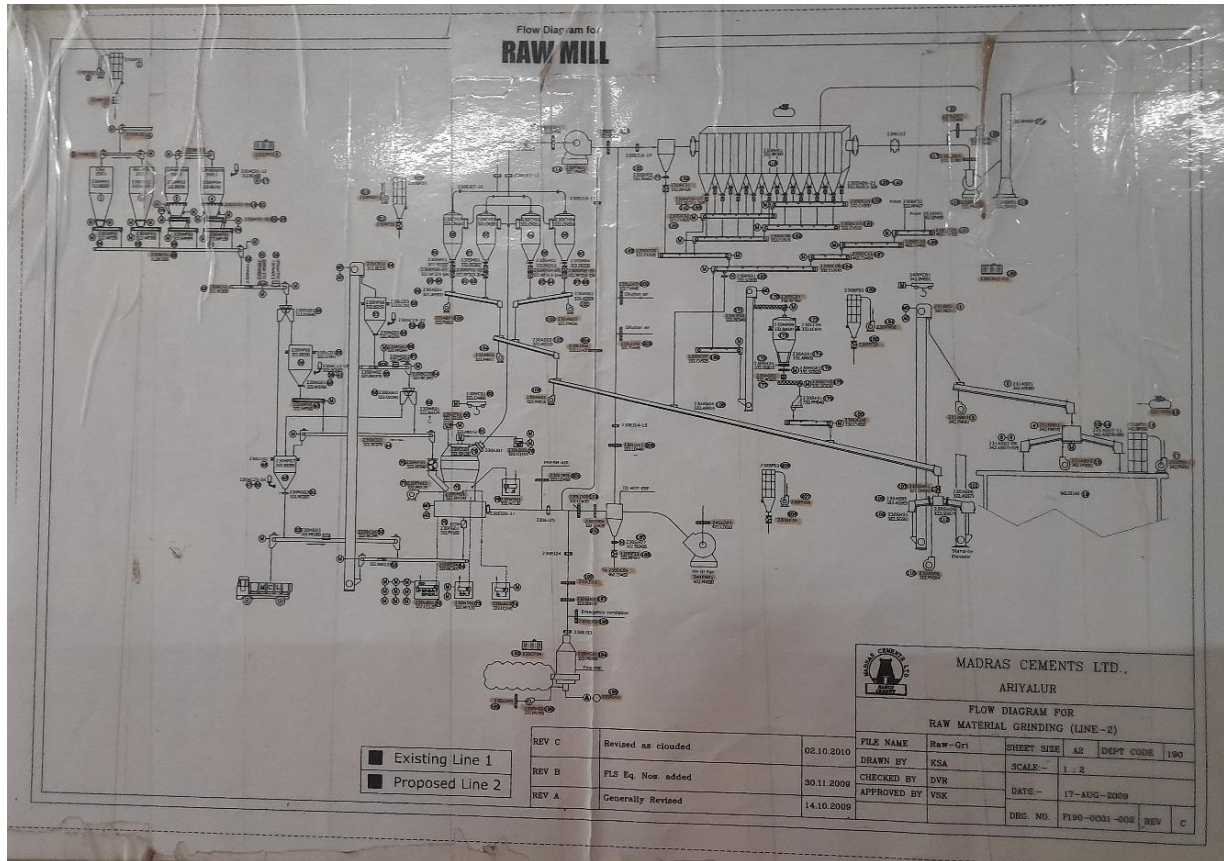


Fig. 3.5.a

Its SC breaking capacity is 44KA and its operating mechanism is based on motor charged. Busbar ducts have 3 runs of 150x6 Aluminium per phase and 3 runs of 150x6 Aluminium per neutral. It differs from place to place and depends on the current carried in the wire. Some wires have Cross linked Poly-Ethylene (XLPE) as an insulation material as it can be used at both high and low temperature. For 1250 KW motor HT capacitor will be connected in parallel. Electronic Tripping Unit (ETU) is a programmable device used to measure current flowing through the Air Circuit Breaker.

3.6) Day 6 (12th June):

Automatic Power Factor Control (APFC) is used for improving power factor by turning ON or OFF the capacitor bank depending on the requirement. Lighting Distribution Board (LDB) is used to distribute power to lighting circuits, 6A power points. Switch Fuse Unit is rated in Amps while Motor feeder is rated in KV.

Tie feeder is taken from Thermal Power Plant and when a fault occurs in TPP, bus coupler is used to switch the load in TPP side to EB side. In the DGSS parallel synchronisation of the alternator and EB side is achieved by using synchroscope method. High Fuel Oil (HFO) is used as the fuel for the IC engine as it has high efficiency compared to diesel oil. OLTC transformer is used for voltage regulation and for phase shifting by varying the transformer ratio without interruption. The plant has a total of 66 MW Steam Turbine Generator with 1 40MW, 1 20MW, and 1 6MW STG.



Fig. 3.6.a

4. Conclusion

The six days were so informative and I got the opportunity to visit the powerplants and to learn about their generation and distribution process. The Internship gave me a lot of insight and understanding about the theories which I have learnt in my academics and their practical applications. I have gained an understanding about Power distribution and the various factors involved in that. Visiting Thermal Powerplant helped me to see the process behind power generation. I would definitely use the knowledge I have gained through the Internship to create a better career and improve my core knowledge and applications. The practical application of the particular courses “Transmission and Distribution, Power Electronics” in semester 4, “AC Machines and Network Analysis” in semester 3 and “DC Machines and Transformers” from semester 2 was learnt from this Internship. As such I would like to conclude my Internship Report and thank everyone who have helped me during the internship.

THANK YOU

5. Appendix



THE RAMCO CEMENTS LIMITED

Govindapuram Works, Sendurai Road, Ariyalur
Ariyalur District, Tamil Nadu, PIN: 621 713
Ph: 04329 - 226 001 to 003, Fax: 04329 - 226 005
Website: www.ramcocements.in
Corporate Identity Number: L26941TN1957PLC003566

12nd June 2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. PERIYAR SELVAN N**, pursuing B.E. EEE - II Year under Register Number: 41140062 from Sathyabama Institute of Science and Technology Chennai has completed his **Internship Programme** at The Ramco Cements Limited, Govindapuram Works, Ariyalur during 6th June 2023 to 12th June 2023.

We wish all the best in his future endeavors.

For THE RAMCO CEMENTS LIMITED

Johnson Antony Leo. A

Sr. General Manager - Human Resources

H. R. M. A.