

• **INDUSTRIAL VISIT REPORT**

**AT ORITECH SOLUTION, CHANGODAR,
AHMEDABAD**



A report submitted

By

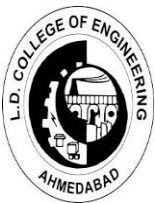
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Acknowledgement

- The industrial visit opportunity with oritech solution was a great chance for learning and professional development. Therefore, we consider ourselves as a very lucky individual as we were provided with an opportunity to be a part of it. We are also grateful for having a chance to meet so many wonderful people and professionals who led us through this visit Time

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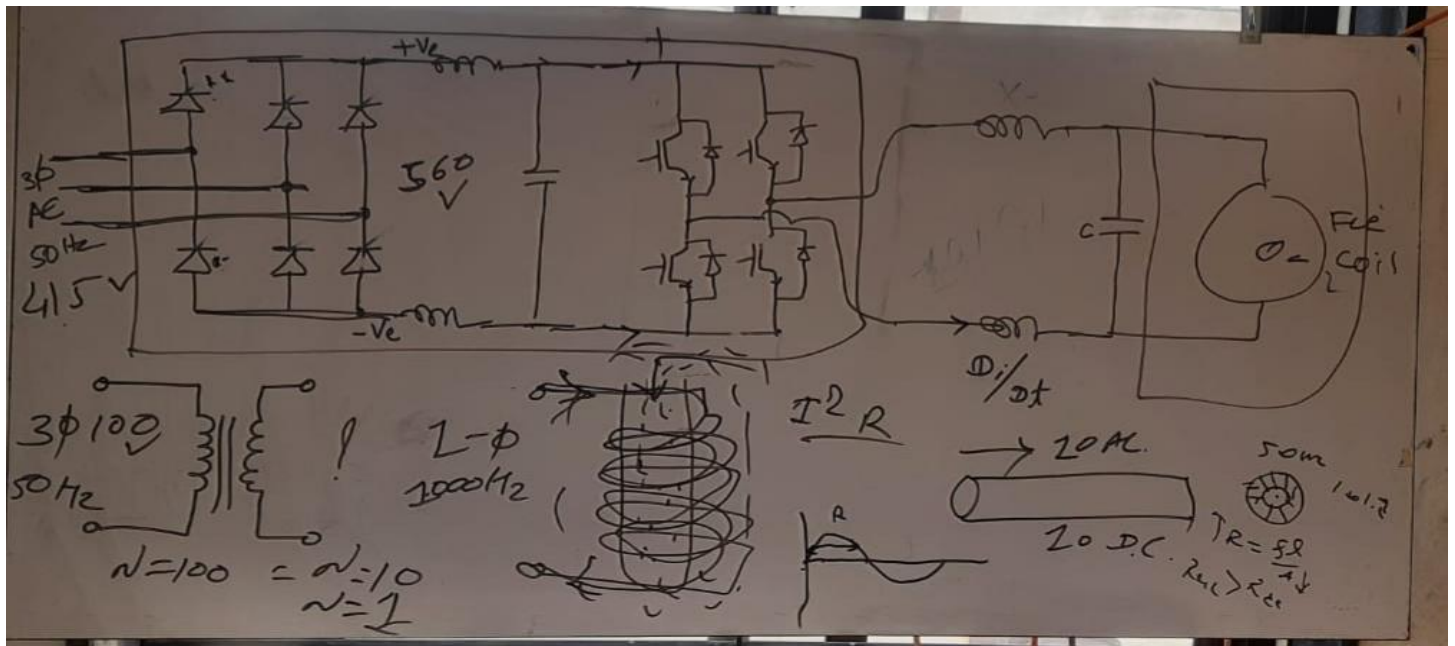
INTRODUCTION

- **ORITECH commenced its operations in the year 2005 with the manufacturing Induction Heating and Hardening Equipment using the IGBT technology in Power Electronics which is more advanced and sophisticated compared to the Thyristor based Induction Equipment commonly used in India**
- **They have installed 100+ heating equipments all over India ranging from 10 kW to 1000kW, 0.5 kHz to 200 kHz and covering a wide range of applications ranging from case and surface Hardening to thorough Heating & from Annealing to Stress relieving. In 2008, They extended our product line by beginning the manufacturing of Induction furnaces. They have successfully installed more than 14 Induction Furnaces for Steel Plants / Foundries with capacity upto 4500kW/12Ton till 2017.**
- **With IGBT Technology, they have been successful in increasing efficiency and cutting down electrical losses for our furnaces. They have given out exceptional figures for unit consumption per kg and melting rates per hour. The in-built demand management circuitry enables the equipment to run most optimally, without crossing demand.**
- **They procure components from the most renowned manufacturers of the world to comply with the quality norms. Our team consists of qualified engineers who are highly experienced in research & development in the field of induction. This experience has helped us in catering to Heat treatment and melting needs, ranging from general purpose machines to fully automated Induction equipment, suiting the widest product line.**



Melting furnace

THEORATICAL UNDERSTANDING



- Basically melting furnace works on the principle of transformer.
- In the induction furnace, a coil carrying alternating electric current surrounds the container or chamber of metal. Eddy current are induced in the metal (charge), the circulation of these current producing extremely high temperatures for melting the metals and for making alloys of exact composition.
- First of all we will give 3 phase supply to the circuit and then by the use of rectifier or thyristor we will convert AC to DC.
- You can see in the figure there is one capacitor which is used to convert totally DC voltage from AC supply. After converting in DC we will apply it to IGBT as shown in figure which will convert DC to single phase high frequency AC voltage

- Now this high frequency AC voltage given to the Furnace coil Which works on the principle of electromagnetic induction.
- By Connecting the secondary side load they produces heat according to I^2R which causes the material to melt.

PRACTICAL UNDERSTANDING

- In the operating unit there are cooler system, igbt's, inverter, rectifiers, moniter and controller, use of entrane to moniter and control each equipments, and optic fibre, transformer..etc
- The moniter used in operating unit is designed by mplab software..
- MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology

- **Features** Process Melting Highly reliable and efficient IGBT based inverter design. Hybrid-Inverter design, having advantages of series and parallel inverter. Short circuit proof Power Circuit.
- **Power factor** above 0.985 for 6-p, 0.992 for 12-p and 0.996 for 24-p converter, at any load condition.



Heating equipments



- Induction Heating is a contactless electric heating process where electrically conductive materials are heated by the principle of electromagnetic induction. Here heat is generated within the conductive material without making direct contact with the source.
- The operating principle in induction heating uses both the principle of Faraday's law of electromagnetic induction and the concept of Joule heating.
- Its operation is quite similar to the transformer that follows faraday's law.
- In transformers when primary winding is energized then the flow of current through it leads to the generation of the alternating magnetic field. The created magnetic flux when gets linked with the secondary winding generates emf within the secondary winding, and current starts flowing through it.

- Suppose l and d are the length and diameter of the cylindrical workpiece. The work coil has an N number of turns, carrying current I . From Lenz's law, the direction of induced eddy current in the cylinder will oppose the vertical flux IN .
- eddy current I_2 is the secondary current with a single turn. Thus, considering no end effects, Primary ampere-turns, $I \cdot N =$ Secondary ampere-turns, $I_2 \cdot 1$ Thus, $I_2 = I \cdot N$
- The power loss in the workpiece, factors affecting induction heating eq1

• Advantages

- The depth of penetration is frequency-dependent thus with varying frequency power wastage during heating can be avoided.
- It favors applications like surface treatment due to the concentration of heat in limited parts.
- It offers quick heating thereby ultimately saving power. Induction heating is quite efficient.
- It provides good operating conditions i.e., without pollution.
- It is an automatic control process thus skilled laborers are not specifically required.
- It offers an automatic temperature control feature.

• Disadvantages

- It needs a high-frequency power source thus is quite costly. Electric supply is necessarily required during operation.

Why we used IGBT

1.) Noise reduction, better efficiency, low switching losses, better control and simpler yet stable operation have made IGBT being widely accepted in all these machines.

2) With IGBT Technology, we have been successful in increasing efficiency and cutting down electrical losses for our furnaces. They have given out exceptional figures for unit consumption per kg and melting rates per hour.

- The in-built demand management circuitry enables the equipment to run most optimally, without crossing demand.**

3.) manufacturing Induction Heating and Hardening Equipment using the IGBT technology in Power Electronics which is more advanced and sophisticated compared to the Thyristor based Induction Equipment commonly used in India,



CONCLUSION

- **We can honestly say that our time spent in industrial visit With oritech solution resulted in one of the best Experience of Our life. Not only did we gain practical skills but also had the opportunity to meet many fantastic people.**
- **Overall, Our Visit at oritech solution has been a success. We were able to gain practical skills, and make .connection that will last a lifetime. We could not be more thankful.**