A REPORT ON INDUSTRIAL TRAINING
AT

JK Tyre & Industries Ltd.

Jaykaygram, Kankroli

RAJSAMAND (RAJASTHAN)

FROM:-2TH AUG to 1TH SEPT 2015

In partial fulfilment of award of Bachelor of Technology degree in Electrical Engineering

RTU, Udaipur
(A research and innovation driven university)

Geetanjali Institute of Technical Studies

SESSION: - 2020-21

Under the guidance of

Dr. Ashish Mani
Asst. Prof. (Dept. of EEE, ASET)

Topic: Study the Power distribution of Electrical Power of JK Tyre Plant. Calculate & Optimize the Transformer & large size motor (over 200hp) efficiency.

Area: Electrical Power System

Submitted To: -
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CERTIFICATE

This is to certify that **Mr. Aditya Shah** student of B.Tech in **Electrical Engineering** department has carried out the work presented in the project of the Industrial Training entitle "**Study the Power distribution of Electrical Power of JK Tyre Plant. Calculate & Optimize the Transformer & Large size Motor(over 200hp) efficiency**" at JK Tyre & Industries Ltd. Kankroli as a part of third year program of Bachelor of Technology in Electrical Engineering from Geetanjali Institute of Technical Studies, Rajasthan Technical University , Udaipur, Rajasthan under my supervision.

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Mr. Gaurav Bohra
Chief Manager (EE&I)
JK Tyre & Industries Ltd.
Kankroli (Raj.)

PREFACE

Industrial training is a way to implement theoretical knowledge to practical use. To become a successful engineer it is necessary to have a sound practical knowledge because it is the only way by which one can learn and acquire proficiency and skill to work efficiency at different industries/places. It is a proven fact that bookish knowledge is not sufficient because the things are not as ideal in practical field as they should be.

In India, a huge amount of public money is invested in govt. undertakings. A country like ours which is based on mixed economy, attaches great importance to public sector like defense, chemicals, fertilizers, petroleum, electronics etc. There acceptability to public depends upon the ways in which they manage and control their finance and gives a profitable system on after discharging their social responsibilities and that in terms which depends upon quality of production of good produced by them and productivity.

It is matter of great pleasure that our college authorities have recommended an industrial training of at least 42 days to supplement our theoretical knowledge acquired in the college.

JK Tyre & Industries Ltd., Kankroli which is one of the examples to understand the production process and productivity in particular of different sizes of Tyres, Tubes and Tubeless Tyres.

In this report an attempt has been made to study the overall production system and related action of JK Tyre & Industries Ltd., Kankroli. That is engaged in production of different types of Tyres namely Nylon, Steel Belted, All Steel, Polyester Belted, Rayon's and other Tyres.

The Project work has been done on studying the Power distribution of Electrical Power of JK Tyre Plant. Calculate & Optimize the transformer & large size Motor (over 200 hp) Efficiency of the industry and a brief project report has been prepared on the same.

ACKNOWLEDGEMENT

Main aim of this Industrial Training is to get practical knowledge about the working of an industry and use of modern engineering in it. Training makes us to know how the knowledge from book is applied to practical life. During my schedule in **JK Tyre & Industries** I got an opportunity to know about the working condition in plant and got more knowledge about my branch of study.

Behind completion of this training, some persons played a key role directly or indirectly. So I would like to thank those persons without whose contribution this work proves too much for me.

I express my deep regards and gratitude to honorable "Dr. Prakash Sundaram" Head of Department (Electrical Engineering, GITS) for suggesting the advice, keen interest, and constant boost up, invaluable guidance.

I am grateful to "Dr. Ashish Mani" Asst. Prof. (EE) at GITS, Udaipur for granting his kind support, mental preparation for training.

I am thankful and grateful to "Mr. Gaurav Bohra" Chief Manager (EE&I) at JK Tyre & Industries Ltd. Kankroli (RAJ.) for giving me chance of training at their prestigious industry, which will be helpful in my progress toward bright future.

I am also helpful to the executive staff, technical and non-technical staff of JK Tyre & Industries for extending their kind support, information and practical knowledge during my 30 days practical training at their unit JK Tyre & Industries (KTP),Rajsamand.

At last I would like to thank CRC (Corporate Resource Center), GITS, Rajasthan Technical University for helping me and guiding me with the rules and regulations during the course of the training.

ABBREVATIONS USED

ABBREVATIONS	FULL NAME
KTP	Kankroli Tyre Plant
LCV	Light Commercial Vehicle
EMS	Energy Management System
CS	Control Solutions
BU	Business Unit
SSU	Service Support Unit
ISO	International Organization for Standardization
HP	Horse Power
MDB	Main Distribution Board
PLC	Programmable Logic Controller
ESD	Economically Sustainable Design
RSEB	Rajasthan State Electricity Board
VAC	Variable Alternating Current
PPE	Personal Protective Equipment
CB	Circuit Breaker
CT	Current Transformer
PT	Potential Transformer
DG	Digital Generator

CONTENTS

ABSTRACT

An Electrical Power Distribution System is the final stage of delivery of Electric Power. It carries electricity from transmission system to various Consumer Machines. Distribution sub-station connects to the transmission system and lowers the transmission voltage to medium voltage ranging from 2 kV to 35 kV with the use of Transformers.

Rural Electrification Systems in contrast to urban system, tend to use higher distribution voltages because of longer distances covered by distribution lines.

In an industry Electricity is received from the stations from where it is stepped-down and fed to different Machines and equipment which helps in production of goods. This step-down process is done by using transformers of different ratings. The rating of transformer is dependent on the type of loads.

Transformer suffers from a number of losses like hysteresis losses, eddy current losses, stray losses, core losses etc. In order to minimize these losses and increase the efficiency of the transformer various methodologies are adopted.

The output from the transformers is fed to the motors of different hp's which further converts electrical energy to mechanical energy in order to drive the Rollers, Strip Winder, Extruders, DIP Unit, Cement House, Banburrys, Calendering etc. Motor losses are mainly due to resistive losses in windings, core losses and mechanical losses in bearings and aerodynamic losses, particularly where cooling fans are present. These losses can be reduced by using Cavity Wall Insulation, double gazing etc.

METHODOLOGY

Methods used while preparing this project report is basically collection of various facts and information related to the structure, uses, advantages and disadvantages, mass production, developments from and latest researches of the Electrical Energy Distribution & reduction of Losses. For this help from various websites related to information containing Power Distribution is taken. Various researches on this topic were published and some of them are gathered here in this project report. Latest journals that have been published in the field of increasing the efficiency are also arranged here to make the attention towards the developments in the field of Energy conservation. Applications of transformers & large size motors in power plants, cement plants, large buildings, airports, malls, multiplexes, hotels, factories, etc. have also been studied and included in this project report.

Part – A

About the Industry

Company Background

JK TYRE is one of the divisions of **JK INDUSTRIES LTD**. The foundation stone of KTP was laid on May 08, 1975. The plant was commissioned in a record time and commercial production started on Jan 01, 1977 after having entered into technical collaboration with the re known tyre manufacturers in the world M/S General Tyre International Co. USA with an initial capacity of 5 lac tyres per annum. When the first tyre rolled out of the Kankroli tyre plant in 1977, well known international and domestic brands had already laid dominance over the market. However through excellent product development and aggressive marketing, JK-TYRE today commands on enviable chunk of the market share in the passenger car, jeep, LCV, farm & truck tyre segments. The present installed capacity is 16. 41 lac tyres, 14.81 Lac tubes and 2.72 lac flaps per annum. It has continuously upgraded plant and machinery in order to stay ahead of its competitors and has many technological firsts to its credit.

The Kankroli tyre plant has recently undergone business process reengineering. For efficient functioning of the organisation the whole plant has been divided into business units and service support units. The whole production has been divided among three business units.

Credentials

- Excellence Award For Outstanding Marketing, 2009.
- JK Tyre wins the National award for excellence in Cost Management, 2009.
- CII Energy Management Award 2009.
- CAPEXIL 'Top' Export Award for the year 2008–2009.
- CII Water Management Award 2009.
- Rajasthan Energy Conservation Award-2009.
- National Energy Conservation Award-2009.
- JK Tyre- Super Brand 2009-10.
- **Hall of Fame**- Golden Steering Wheel 2010.
- CEO of the Year award to Dr. Raghupati Singhania VC & MD

Vision & Mission

Vision

- To be amongst the most admired companies in India, committed to excellence.

Mission

- Be a customer Obsessed Company-Customer First 24x7
- No.1 Tyre Brand in India
- Most profitable Tyre Company in India
- Motivated and Committed team for excellence in performance
- Be a Green Company
- Deliver Enhanced Value to all stakeholders
- Enhanced global presence through Acquisition/JV/Strategic Partnerships

Introduction

Tyre: A precisely engineered assembly of rubber, chemicals, fabric and metal designed to provide traction, cushion road shock and carry a load under varying conditions.

Geometrically: A tyre is torous.

Mechanically: A flexible membrane pressure container.

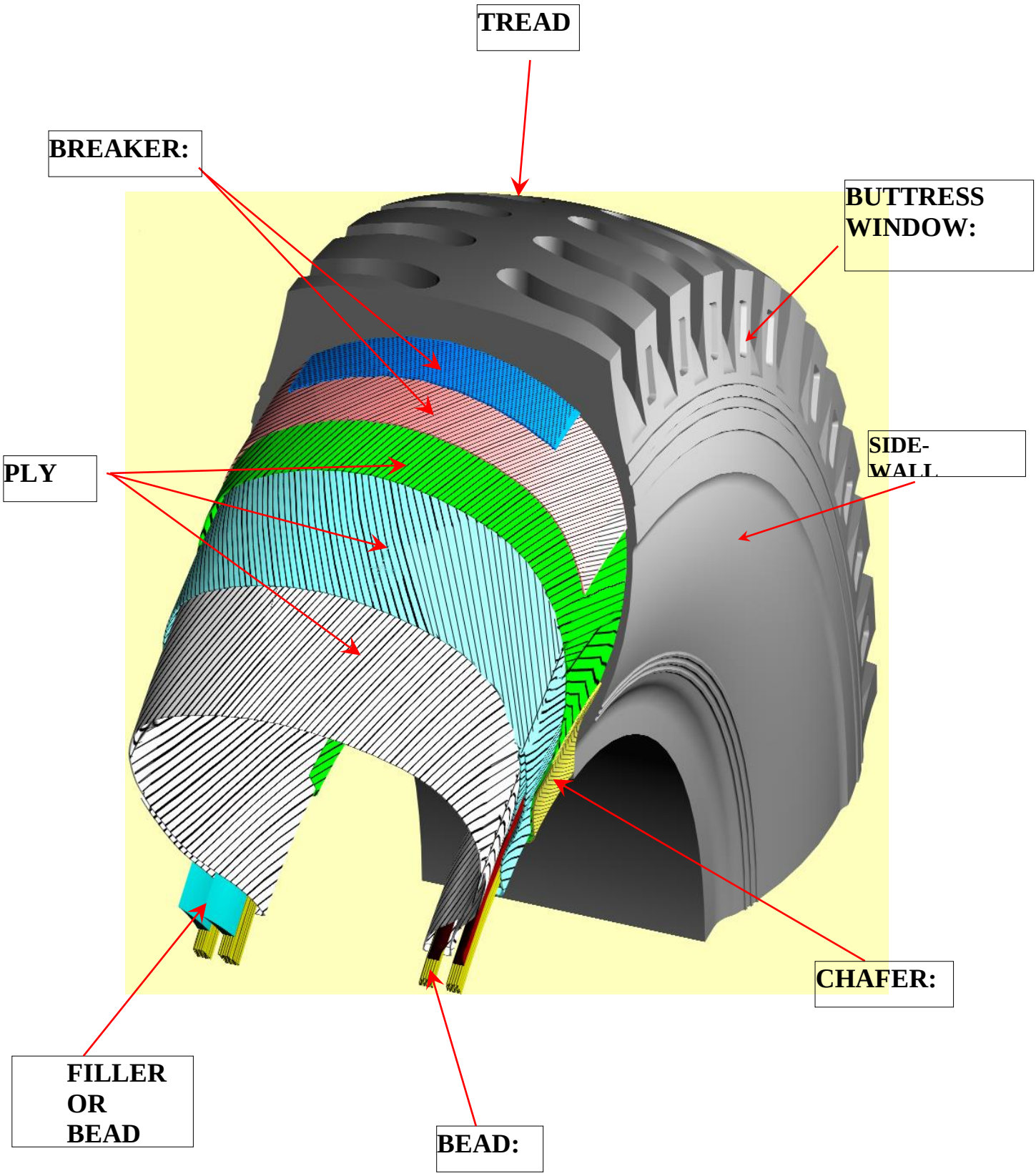
Structurally: A high performance composite.

Chemically: A material of long chain polymer.

Basic Requirements of Tyre:

- Load carrying capacity
- Transmit driving/breaking torque
- Provide flotation
- High durability
- Good appearance
- Heat resistance
- Fatigue resistance
- Low rolling resistance
- Weather resistance
- Low energy loss
- Riding comfort
- Low noise level

Components of Tyre: Tyre is the only engineering product which requires three-dimensional performances. It is a high product made by combining many components. Each component has its unique role in overall performance of tyre.



Tread: That portion of a tyre that comes into contact with the road. It is distinguished by the design of its ribs and grooves. This provides the traction, maneuverability and determines the mileage of the tyre.

Breaker: A rubber-coated layer of cords that is located between the plies and the tread. It helps in bonding between the tread and plies and protects the casing from road shocks.

Carcass: Two to eight cross-plied nylon fabric reinforced rubber sheet structure forming the skeleton of the tyre. It carries load and acts as the skeleton of the tyre.

Ply: A rubber-coated layer of fabric, usually Nylon, containing cords that run at opposite angle to each other; extending from bead to bead. No. of plies determines the strength of the tyre and load carrying capacity of the same.

Sidewall: That portion of a tyre between the tread and the bead, which flexes in service. All the tyre related information is written on this part of tyre. This protects the plies from getting damaged from external cuts.

Bead Assembly: It consists of three parts: Bead wire, Filler & Flipper.

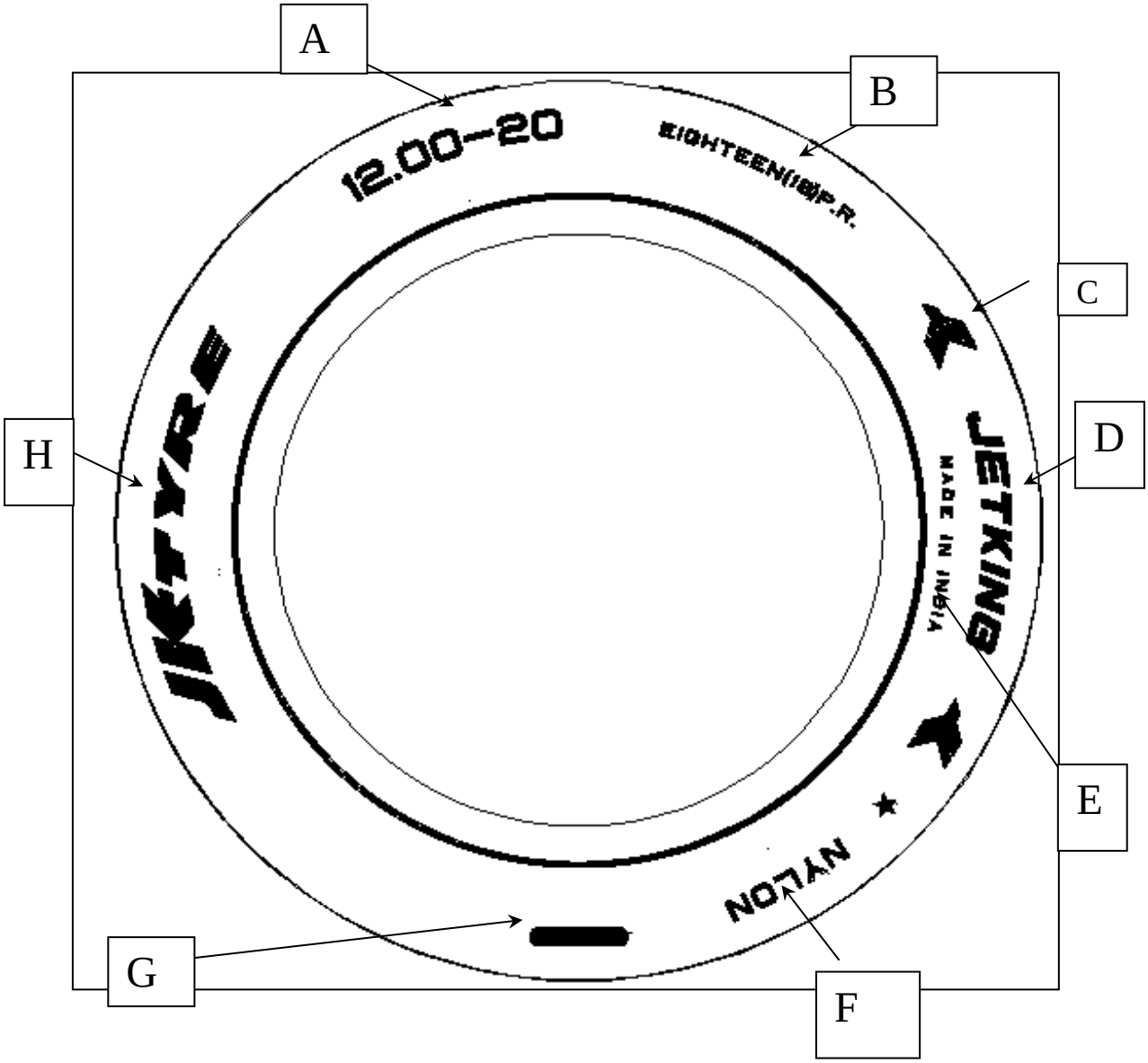
Bead wire: A round hoop of steel wires, wrapped or reinforced by ply cords, that is shaped to fit the rim; holds the tyre onto the rim.

Bead Apex or Filler: A solid rubber placed over bead. In the absence of filler air entraps and causes bead separation.

Flipper: It covers the bead and filler assembly without any air gap. It also provides stiffness and modulus gradation to the bead area.

Chafer: Rubber coated Nylon cross woven fabric. It protects bead from chafing action of rim.

Tyre Sidewall



A: Tyre Size (12. 00 indicates Section width & 20 Rim Dia in Inch)

B: Ply rating of the tyre

C: Logo of the manufacturer

D: Brand Name

E: Manufacturing Country

F: Type of Fabric used.

G: Tyre serial Number & date code

H: Manufacturer Name

Production Unit

The company is headquartered in New Delhi, Bahadur Shah Zafar Marg. Registered office is in Kankroli, Rajasthan. Manufacturing plants are located at six centers in India, located at:

- Mysore, Karnataka
- Banmore, Madhya Pradesh
- Kankroli, Rajasthan
- Chennai, Tamil Nadu

The whole production at KTP is divided into 3 Business Unit. Each Business Unit performs a particular task and helps in production of goods.

Business Unit 1 (BU 1)

It includes:

- Raw Materials
- Mixing
- DIP Unit
- Calenders
- Extruders
- Cement House

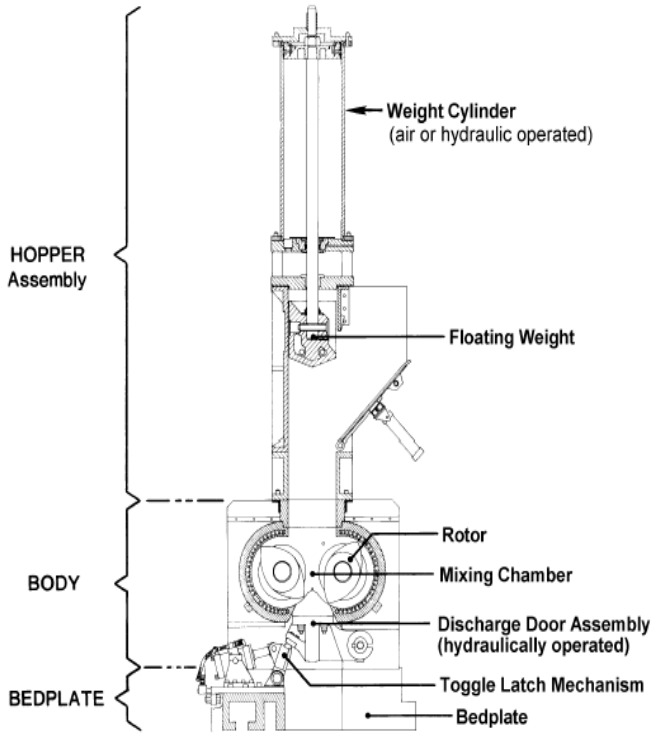


FIGURE 2-1 F SERIES BANBURY MIXER

Business Unit 2 (BU 2)

It Includes:

- Bias Cutting
- Slitting Machine & Breaker Assembly
- Band Preparation
- Green Tyre Building

Business Unit 3 (BU 3)

It Includes:

- Tyre Curing
- Tube/Flap/Bladder Curing
- Awling
- Jamming
- Painting
- Trimming
- EMS & Safety Implementation
- Inspection
- Cost Reduction

Service Support Unit

To take care of the centralized activities service support units have been formed. There are 5 service support units taking care of the specialized activities.

1) **Service Support Unit 1 (SSU 1)**
    - Engineering Services
2) **Service Support Unit 2 (SSU 2)**
    - Commercial Services
3) **Service Support Unit 3 (SSU 3)**
    - People Services
4) **Service Support Unit 4 (SSU 4)**
    - Knowledge Services
5) **Service Support Unit 5 (SSU 5)**
    - Factory Management

Part – B

Project Report

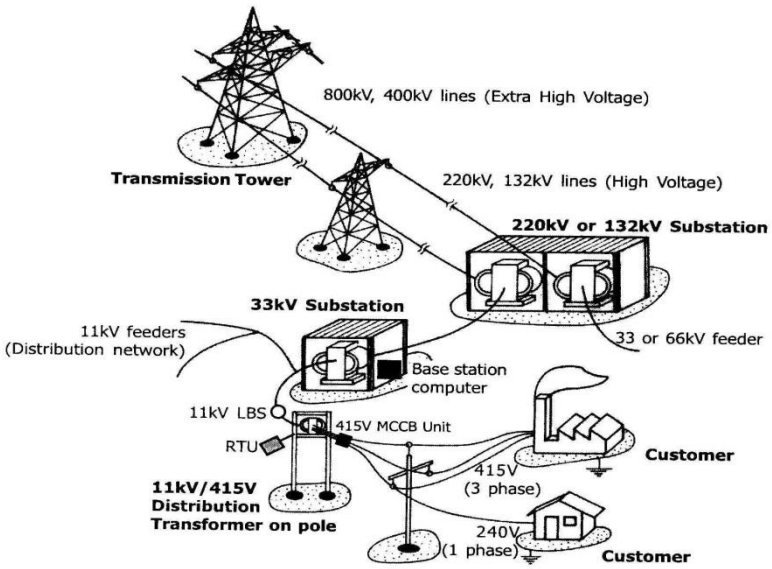
Study the Power distribution of Electrical Power of JK Tyre Plant. Calculate & Optimize the Transformer & large size motor (over 200hp) efficiency

Introduction : Power Distribution System

An Electric power distribution system is the final stage in the delivery of electric power. Distribution sub-stations connect to the transmission system and lower the transmission voltage to medium voltage between 2kV and 35 kV with the use of transformers. Customers demanding a much larger amount of power may be connected directly to the primary distribution level or the sub-transmission line. Distribution of electric power is done by distribution networks. Distribution networks consist of following main parts:

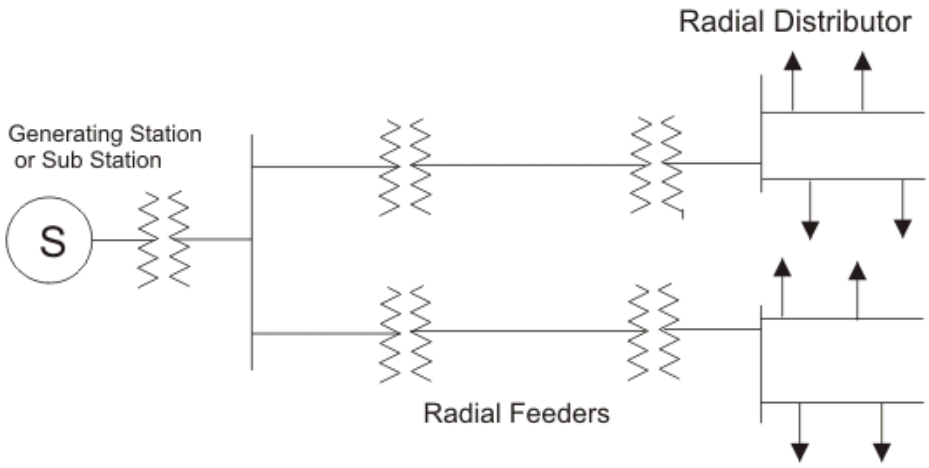
1) Distribution substation,
2) Primary distribution feeder,
3) Distribution Transformer,
4) Distributors,
5) Service mains.

Distribution transformers are mainly 3 phase pole mounted type. The secondary of the transformer is connected to distributors. Different consumers are fed electric power by means of the service main. Both feeder and distributor carry the electrical load, but they have one basic difference. Feeder feeds power from one point to another without being tapped from any intermediate point, as because there is no tapping point in between. The distributors are tapped at different points for feeding different consumers and hence current varies along their entire length.



Radial Electrical Power Distribution System

In early days of electrical power distribution system, different feeders were radially come out from the substation and connected to the primary of distribution transformer directly.

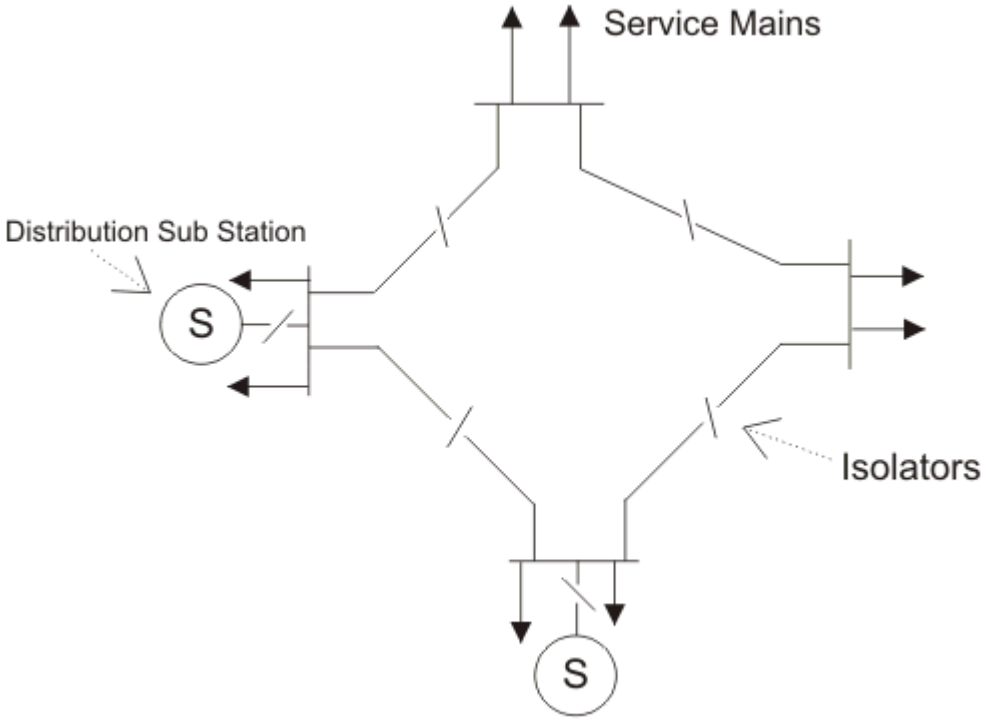


Radial Electrical power distribution system has one major drawback that in case of any feeder failure, the associated consumers would not get any power as there was no alternative path to feed the transformers. In case of transformer failure also, the power supply is interrupted.

Ring Main Electrical Power Distribution System

The Ring system of network distribution is feed by more than 1 feeder. In this case if one feeder is under fault or maintenance, the ring distributor is still energized by other feeder connected to it.

In this way, supply to the consumers connected to the healthy zone of the ring, can be maintained even when one section of the ring is under shutdown.

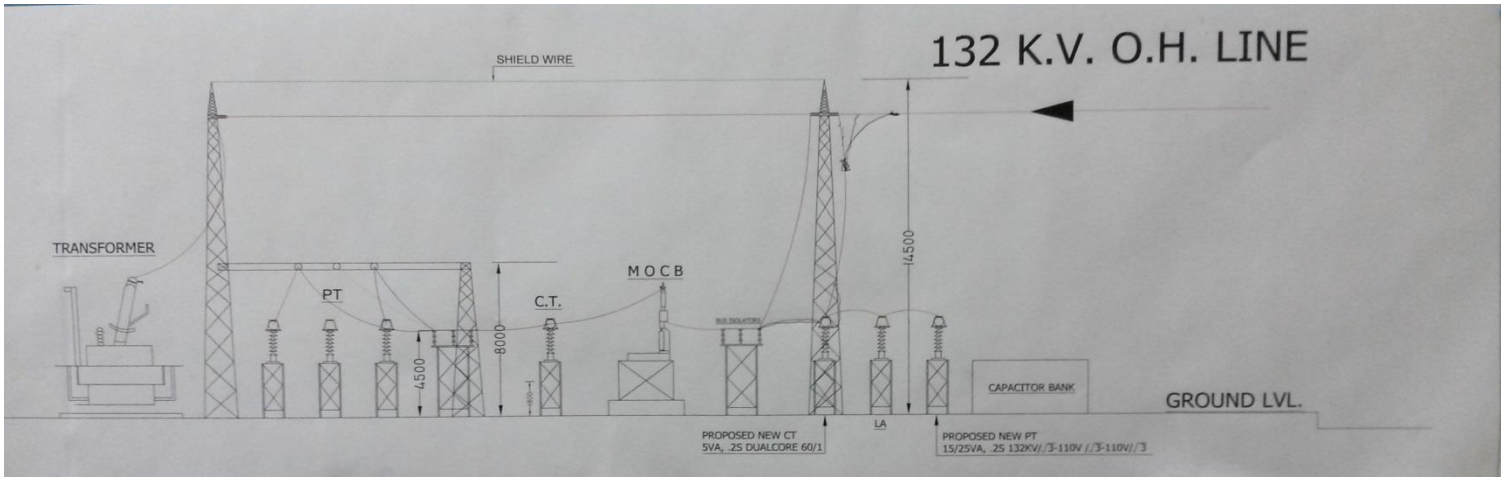


Distribution System of KTP

The KTP of JK Tyre Plant has a long distribution system which converts HT power to LT power or vice-versa at different stages. KTP is fed by power from 2 feeders:

1) **RSEB:** Rajasthan State Electricity Board provides electricity to the plant for its smooth functioning.

2) **DG's:** If there is a power cut than immediate power supply is needed to protect the tyre from becoming a scrap in the press. This power requirement is fulfilled by operation 3 Generators of 4MW each.



The plant has 14 transformers to step down the power so that it can be transmitted to different motors and machines to carry out the production in an efficient manner. Power is stepped down at various stages:

1) **Primary Distribution:** Electricity from RSEB or DG's is first fed to the 2 transformers of 10MVA and 15MVA each. These transformers step down the power from 132kV to 11kV. Some machines and large size motors like banburies which operates on high voltage directly take power from these transformers.

Transformer Capacity: 15 MVA	Transformer Capacity: 10 MVA
Make: BBL	Make: BBL
Volts HV: 1,32,000 V	Volts HV: 1,32,000 V
Volts LV: 6,600 V	Volts LV: 6,600 V
Oil Capacity (L): 12,000	Oil Capacity (L): 11,440
Year of Mfg.: 1985	Year of Mfg.: 1976
Connection Type: Star-star	Connection Type: Star-star

2) **Secondary Distribution:** The power from 15MVA and 10 MVA transformers is fed to 12 small transformers. These transformers convert the 11kV to 440 Volts and distribute the power to motors, DIP Unit, Curing section, cabins etc. All these transformers are Delta-Star Grounded.

Transformer-1
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-2
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-3
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-4
Capacity: 2,000 KVA
Make: Gujarat
Volts HV: 6,600 V
Volts LV: 415 V
Oil Capacity (L): 1,260
Year of Mfg.: 1980

Transformer-5
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-6
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-7
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-8
Capacity: 1,500 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 433 V
Oil Capacity (L): 1,200
Year of Mfg.: 1975

Transformer-9
Capacity: 2,000 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 415 V
Oil Capacity (L): 1,300
Year of Mfg.: 1975

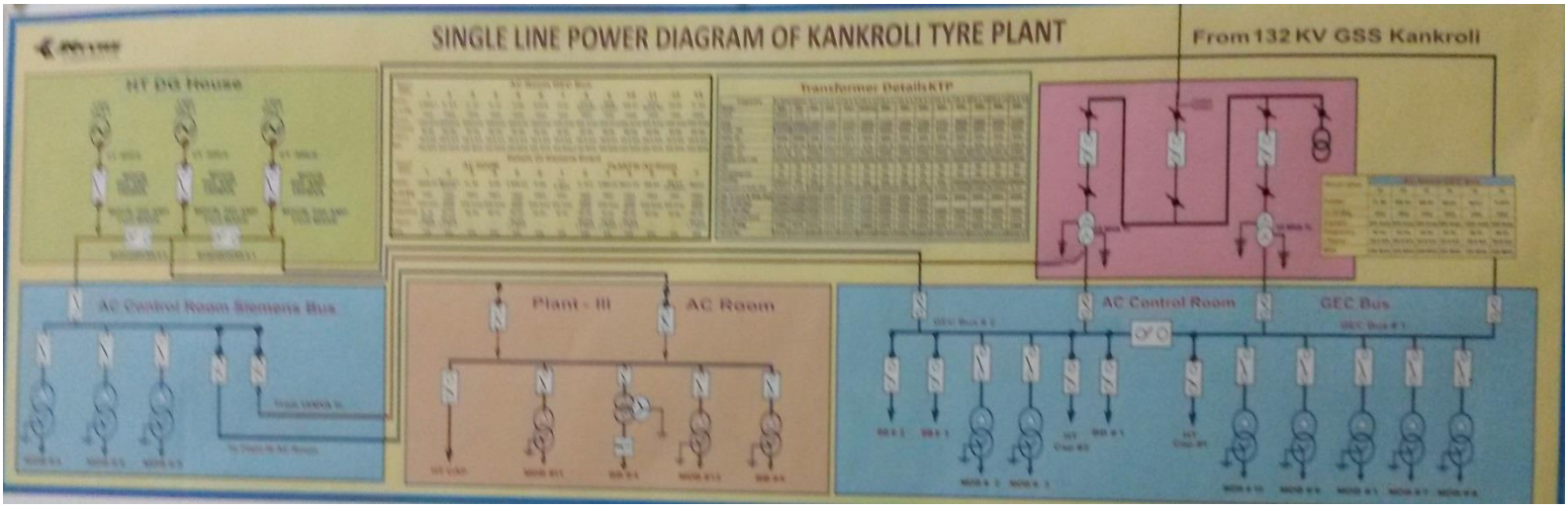
Transformer-10
Capacity: 2,000 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 415 V
Oil Capacity (L): 1,300
Year of Mfg.: 1975

Transformer-11
Capacity: 2,000 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 415 V
Oil Capacity (L): 1,300
Year of Mfg.: 1975

Transformer-12
Capacity: 3,100 KVA
Make: BBL
Volts HV: 6,600 V
Volts LV: 415 V
Oil Capacity (L): 1,200
Year of Mfg.: 1983

3) **Back Up Distribution:** If any fault occurs in the RSEB distribution then the plant is operated on three 4 MW Generators.

The below diagram shows the overall transmission system of KTP.

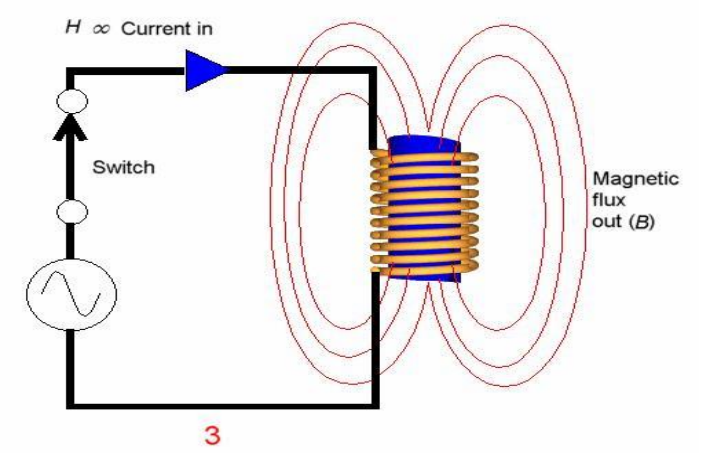


Introduction : Transformer

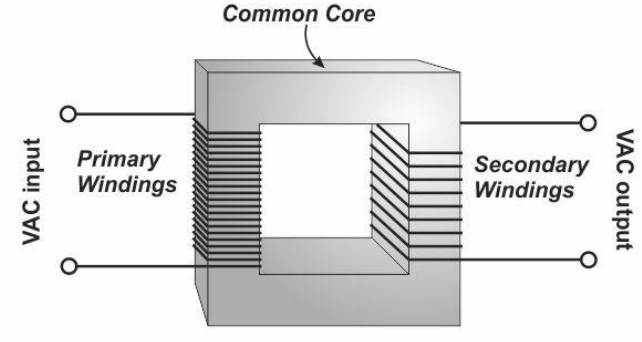
Distribution transformers are very efficient, with losses of less than 0.5% in large units. Smaller units have efficiencies of 97% or above. It is estimated that transformer losses in power distribution networks can exceed 3% of the total electrical power generated. In India, for an annual electricity consumption of about 500 billion kWh, this would come to around 15 billion kWh. Reducing losses can improve Transformer efficiency.

Principle of Transformer Action

A current flowing through a coil produces a magnetic field around the coil. The magnetic field strength H, required to produce a magnetic field of flux density B, is proportional to the current flowing in the coil. Figure shown below explains the above principle



The above principle is used in all transformers. A transformer is a static piece of apparatus used for transferring power from one circuit to another at a different voltage, but without change in frequency. It can raise or lower the voltage with a corresponding decrease or increase of current.

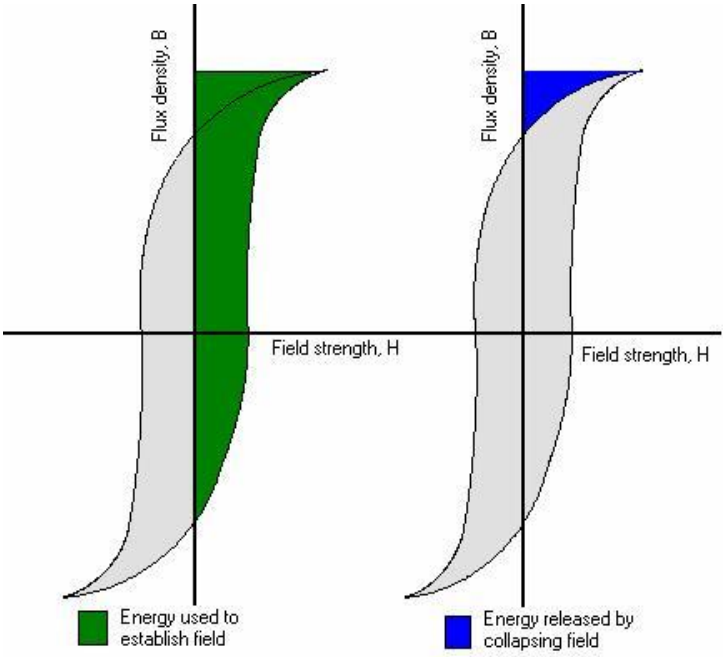


Losses in Transformer

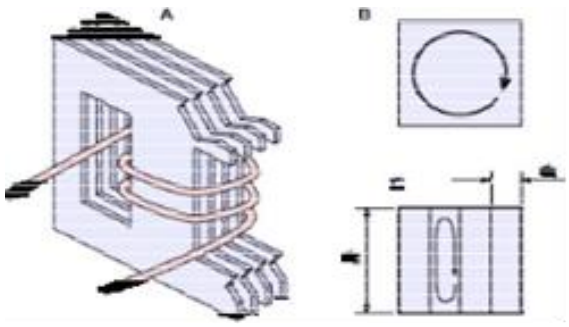
The losses in transformer are as under:

• **Di-Electric Loss:** These losses occur due to electrostatic stress reversals in the insulation.

• **Hysteresis Loss:** Hysteresis losses originate from the molecular magnetic domains in the core laminations, resisting being magnetized and demagnetized by the alternating magnetic field.



• **Eddy Current Loss in the Core:** The alternating flux induces an EMF in the bulk of the core proportional to flux density and frequency.



• **Resistive Losses in the Windings:** These represent the main component of the load dependent or the variable losses, designated as I^2R or copper losses.

Transformer Efficiency

The efficiency losses occur in the primary and secondary coils of the transformer. Coil loss is a function of the resistance of the winding materials and varies with the load on the transformer. Reducing losses can increase transformer efficiency.

The Transformer efficiency can be calculated by following formula.

$$\% \text{ Efficiency} = \frac{\text{Output x100}}{\text{Output x Losses}}$$

$$= \frac{\text{P x kVA rating x p.f.x1000 x100}}{\text{P x kVA rating x p.f.x1000 x N.L x L.L.x p}^2 \text{ x T}}$$

Where,

p = per unit loading

N.L. = No load losses in Watts

L.L. = Load losses in Watts at full load, at 75 °C

T = Temperature correction factor

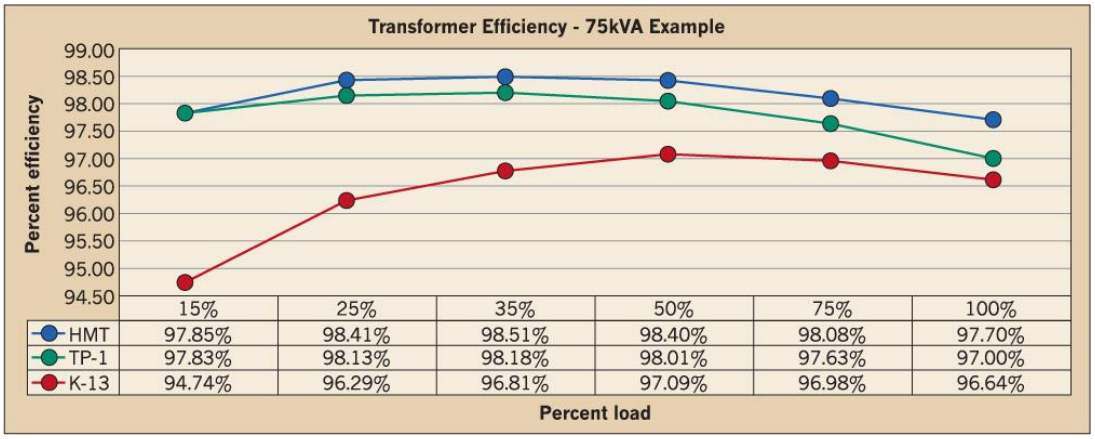
p.f. = Load power factor

Following Data was collected and a table is prepared containing the average Output power and the losses of 4 months of the plant. By this means the percentage efficiency is calculated of all the transformers installed in the plant.

Month		June'15	May'15	April'15	March'15
MDB 1	O/P Power (W)	10857	9827	10010	10260
	Losses (W)	2128	1781	1839	1760
	Efficiency (%)	83.61186	84.657133	84.479703	85.3577371
MDB 2	O/P Power (W)	10637	10419	9487	10110
	Losses (W)	2491	2052	758	1590
	Efficiency (%)	81.025289	83.5458263	92.601269	86.41025641
MDB 3	O/P Power (W)	9208	10867	9494	7310
	Losses (W)	239	11	57	165
	Efficiency (%)	97.470096	99.8988785	99.403204	97.79264214
MDB 5	O/P Power (W)	12305	10990	11021	11662
	Losses (W)	1585	1382	1505	1617
	Efficiency (%)	88.588913	88.8296153	87.984991	87.82287823
MDB 6	O/P Power (W)	8592	5820	5820	5820
	Losses (W)	2455	373	385	55
	Efficiency (%)	77.776772	93.9770709	93.795326	99.06382979
MDB 7	O/P Power (W)	11909	3056	11697	11138
	Losses (W)	3776	1133	3365	1295
	Efficiency (%)	75.926044	72.9529721	77.659009	89.58417116
MDB 8	O/P Power (W)	11100	11500	7300	9400
	Losses (W)	4004	3990	1146	3237
	Efficiency (%)	73.490466	74.2414461	86.431447	74.38474321
MDB 9	O/P Power (W)	12913	11082	13892	12902
	Losses (W)	7793	4521	6149	4977
	Efficiency (%)	62.363566	71.0248029	69.317898	72.16287264
MDB 10	O/P Power (W)	5035	5742	5327	4044
	Losses (W)	3214	2337	3430	2107
	Efficiency (%)	61.037702	71.0731526	60.831335	65.74540725
MDB 11	O/P Power (W)	17286	12226	7348	8059
	Losses (W)	949	237	65	115
	Efficiency (%)	94.795723	98.0983712	99.123162	98.59310007

Observations

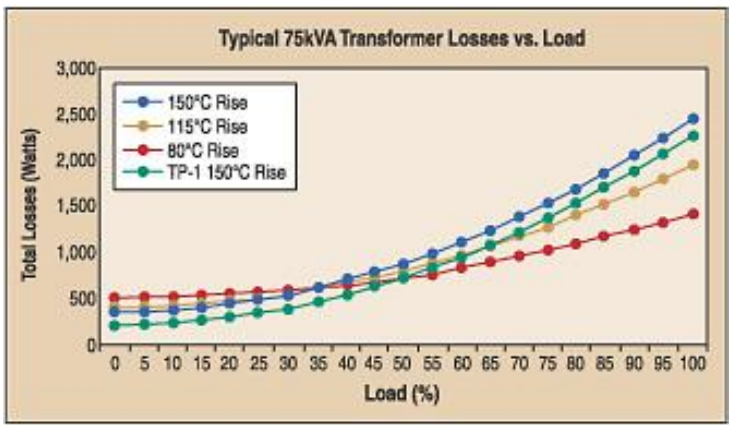
From the above data analysis we observed that all the MDB's are working correctly with mere fluctuation in their efficiency. But MDB 9 and 10 needs to be checked because high losses are occurring across it and a reduced efficiency is obtained.



	15%	25%	35%	50%	75%	100%
HMT	97.85%	98.41%	98.51%	98.40%	98.08%	97.70%
TP-1	97.83%	98.13%	98.18%	98.01%	97.63%	97.00%
K-13	94.74%	96.29%	96.81%	97.09%	96.98%	96.64%

Reduction of Losses

- Using better material for construction
- Minimizing Iron loss
- Using Amorphous Cores
- Using thick section of conductor
- Decreasing radial thickness by sectionalisation leads
- Using good quality magnetic steel
- Using a laminated core

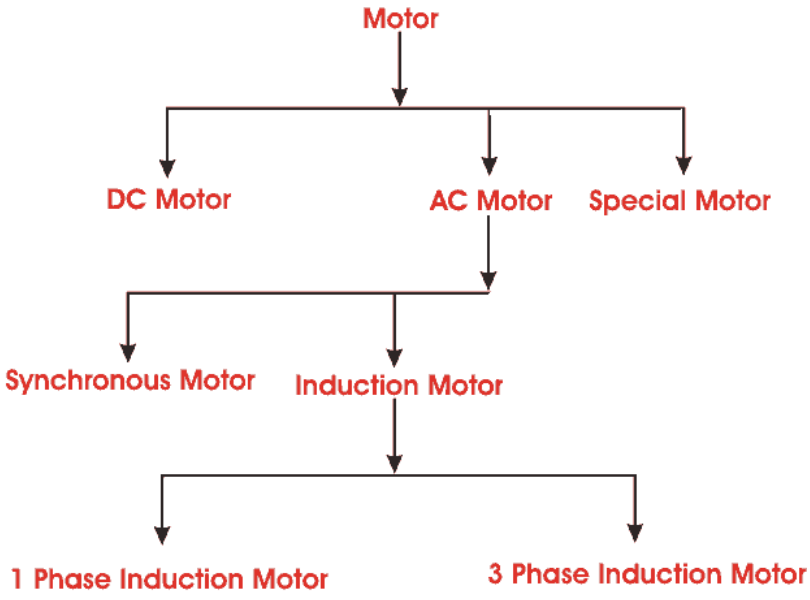


Introduction : Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. In simple words we can say a device that produces rotational force is a motor. The very basic principal of functioning of an electrical motor lies on the fact that force is experienced in the direction perpendicular to magnetic field and the current, when field and current are made to interact with each other.

Classification or Types of Motor

The primary classification of motor or types of motor can be tabulated as shown below:



Motor Efficiency

Electrical motor efficiency is the ratio between the shaft output power and the electrical input power.

$$\eta_m (\%\text{efficiency}) = P_{out} / P_{in} \times 100$$

where

η_m = motor efficiency

P_{out} = shaft power out (Watt, W)

P_{in} = electric power in to the motor (Watt, W)

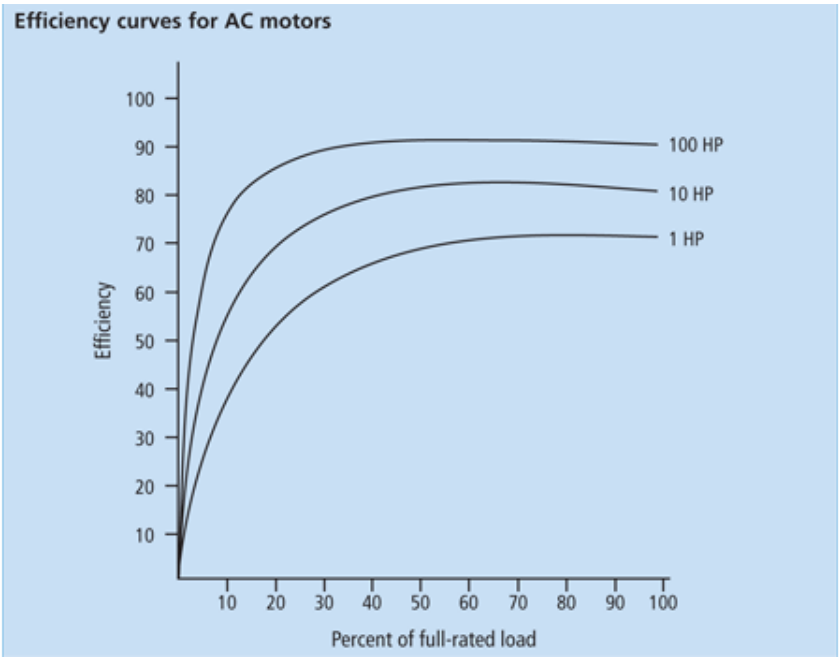
In KTP there are 5 banburies or motors of rating above 1200 hp. Following Data was collected and a table is prepared containing the average Output power and the Input Power of 3 months of the plant. By this means the percentage efficiency is calculated of all the motors installed in the plant.

Month		June'15	May'15	April'15
Motor 1	O/P Power (W)	8127	8817	9115
	I/P Power (W)	10037	10037	10037
	Efficiency (%)	80.9704	87.845	90.814
Motor 2	O/P Power (W)	12013	11008	10670
	I/P Power (W)	12467	12467	12467
	Efficiency (%)	96.3584	88.2971	85.5859
Motor 3	O/P Power (W)	10313	11246	10796
	I/P Power (W)	12255	12255	12255
	Efficiency (%)	84.1534	91.7666	88.0947

Motor 4	**O/P Power (W)**	10330	10771	11302
	I/P Power (W)	12255	12255	12255
	Efficiency (%)	84.2921	87.8907	92.2236
Motor 5	**O/P Power (W)**	7469	8225	9416
	I/P Power (W)	10037	10037	10037
	Efficiency (%)	74.4147	81.9468	93.8129

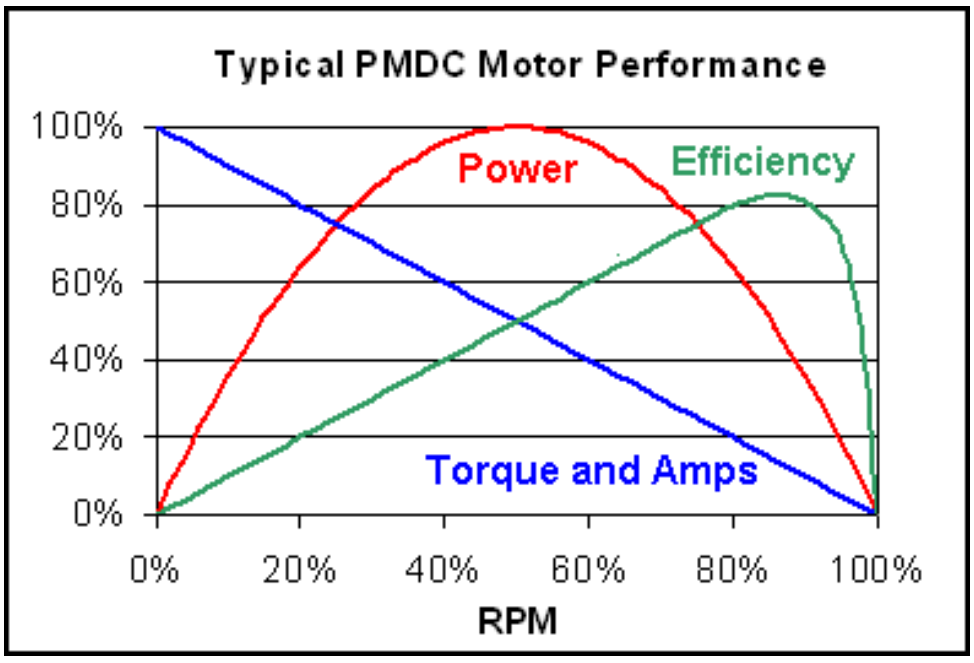
Observations

From the above data analysis we observed that all the Motors's are working correctly with mere fluctuation in their efficiency. But Motor 5 need to be checked because high losses are occurring across it and a reduced efficiency is obtained.



Reduction of Losses

- Transmitting power at high voltage
- Increase amount of copper wire in the slot
- Increasing flux density in air-gap
- Decreasing lamination steel thickness
- Using two layer winding instead of single layer winding
- Optimize the fan design
- Optimizing bearing selection
- Insulate rotor bars
- Transposed turns



SUMMARY

As a part of Industrial Training this project describes the distribution system of the plant and transformer and motor efficiency. Distribution system is of utmost importance as it gives us the overall idea about the power that where and how much power is being transmitted. By studying this we get to know about the ratings of the transformers.

In this Project we have studied about the transformer and its efficiency. We have also analyzed and summarized the data to reach a conclusion about the installed transformers. The efficiency check made us aware about the losses occurring on each transformers and corrective measures taken to minimize the losses. In this way a much of the power can be saved and utilized efficiently.

We have also studied in brief about the motor and its efficiency. We get to know about the total number of large motors installed in the plant. The data analyses informed us about the losses occurring on each motors by telling us about the efficiency. By taking corrective measures this power loss can be minimized.

In this report, stress is given mainly on how energy can be saved in many ways by using Energy Management Systems. Various methods are suggested like usage of laminated core, using thick conductors etc. which can enhance the efficiency thus reducing the cost and most importantly saving the power. It is said that to use 1 unit of power 2 unit of power need to be produced. So power saving can help the industry to bring maximum output from the machines at minimal cost.

Future Prospectus

Industries are the backbone of Economy. These help in fulfilling the needs of country and its people. For industrial work, a lot of energy is utilized. To prevent it from any wastage, Energy Management System has been developed. It helps in monitoring the energy being used for the industrial work and providing with the solutions to control its usage in the efficient manner.

With the continuous decrease in the natural resources and the raw materials, there might be a day when there would possibly be the non-availability of these resources even to generate the energy required for the industrial purpose.

Thus, there has to be some modification in the present day EMS which can avail the facilities of recycling the waste energy which is being dissipated in the form of heat. Also to build an automated control system that can monitor and control the energy efficiently.

CONCLUSION

It was a great experience to be there in **JK Tyre & Industries, Kankroli** for my Industrial Training. Like every good thing, it had come to an end so it did. Though I am feeling sad at this point of time while leaving from here but I do have great memories of time spent here.

During last 30 days, I certainly learnt a lot about every aspect of this field, right from the working environment to the technical details of various equipment's and process. Relating to my branch, I certainly learnt a lot about the Power Distribution System, Transformers and Motors in the area of Electrical Power System.

Moreover I have learnt the basic benefits of Power Saving. Also, I studied about the losses occurring on the transformers and motors and how it can be minimized.

The things are numerous, while words are only few. To conclude, I would rather say that even after my full try, I could pick up only mouthful knowledge out of sea. The time was really very less while there was a lot to learn.

Well, that's how the life goes on. I hope I would have another chance to visit and learn more in it.

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Feedback by Industrial Guide:

Feedback by Faculty Guide: