REWINDING OF THREE PHASE SQUIRREL CAGE INDUCTION MOTOR

Presentation by
Group 01

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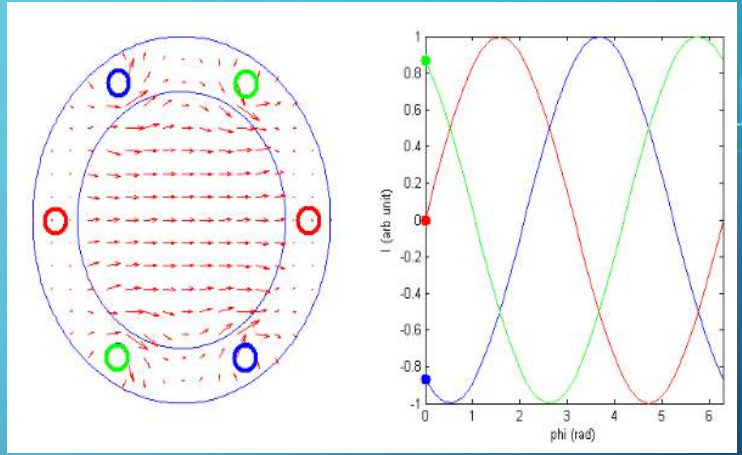
OBJECTIVES

- Reconstructing three phase squirrel cage induction motor from scratch.
- To get familiar with the inner structure of induction motor .
- To get familiar with the phase connection in stator winding and the phase sequence.

THEORY

Induction Motor consists of 2 main Parts

- Stator
- Rotor



Stator

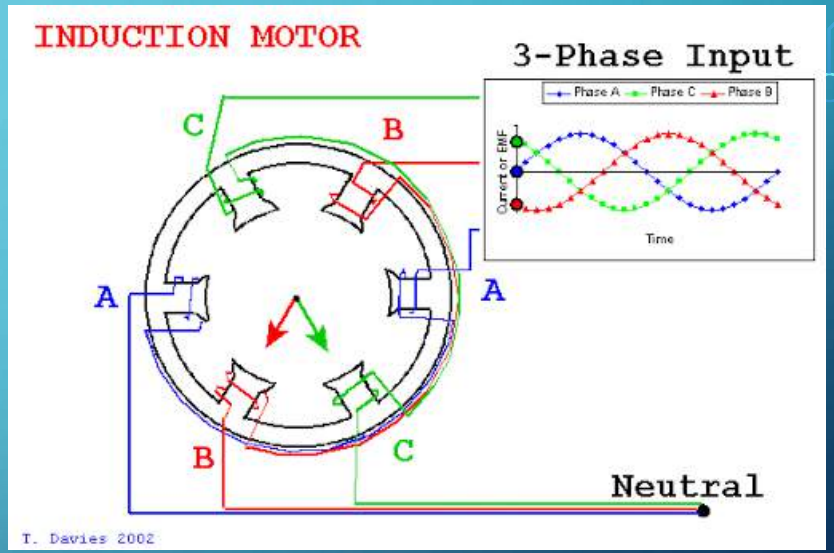
- Consists of Lamination of Silicon steel
- Conductors are placed
- 3 Phase Voltage is supplied in windings
- Rotating Magnetic Field Produces

Rotor

- Cylindrical core, Wound and Cage
- Magnetic Field induces

Rotation Principle

- According to Electro-magnetic induction voltage induces in the rotor
- This voltage produces a current and which magnetic field in the Machine.
- Thus Rotor magnetic field try to catch up stator magnetic field.
- Hence, the Induction Motor rotates.



with

$$e_{ind} = (\mathbf{v} \times \mathbf{B}) \cdot \mathbf{l}$$

MOTOR RATINGS

RATINGS	VALUES
Type	TR6334
Speed	1400rpm
Nominal Current	0.7A
Voltage Rating	380-440V
Power (KW)	0.18
Insulation Class	F
Ingress Protection	55

PROCEDURES

STEP 01

DISASSEMBLING THE MOTOR

DISASSEMBLING THE MOTOR

Main parts of Induction motor are:

1.Stator.

2.Rotor.

3.Shaft.

4.Casing.

Motor Casing

Stator

Rotor

Propeller

STEP 02

WIRE MEASUREMENT

- **Wire measured = 540 grams**

STEP 03

MAKING INSULATION PAPER

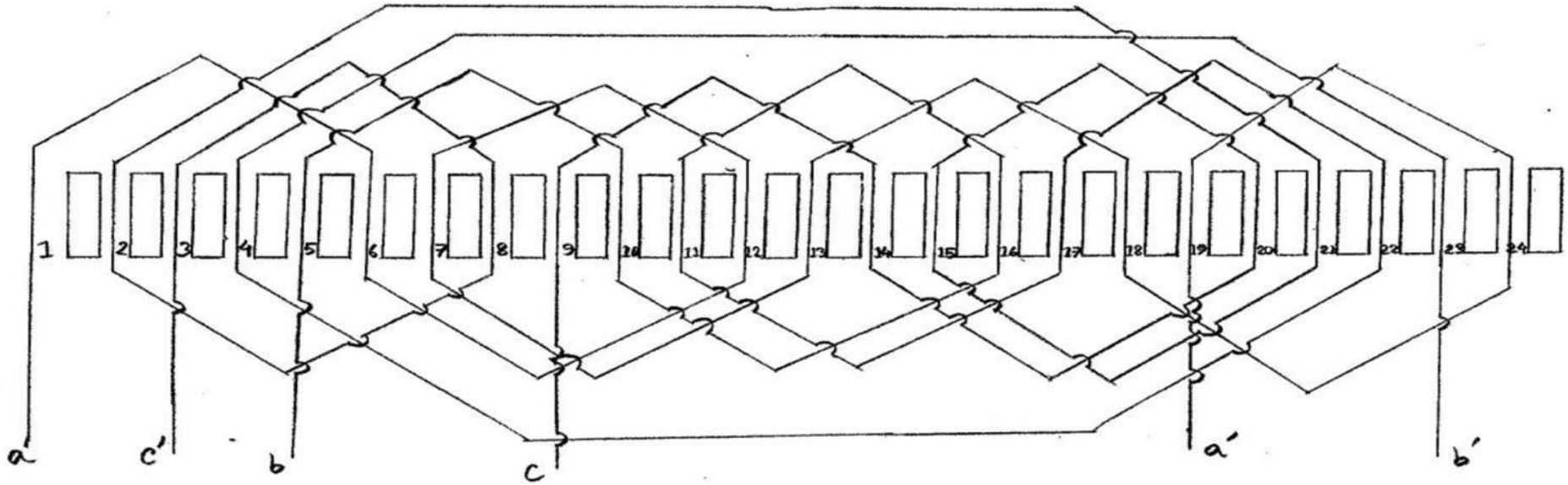
Making a insulation paper

Inserting in a slot

STEP 04

CONNECTION DIAGRAM

INDUCTOR MOTOR WIRING



a ⟶ 1 – 6
7 – 12
13 – 18
a' ⟶ 19 – 24

b ⟶ 5 – 10
11 – 16
17 – 22
b' ⟶ 23 – 4

c ⟶ 9 – 14
15 – 20
21 – 2
c' ⟶ 3 – 8

STEP 05

REWIRING THE MOTOR

Creating Coils

220 turn coils

Inserting a coil

Single coil inserted in slots

Coils placed with insulation seperating each coil

Connection wires with varnish added

Rotor placed inside

Final Product

STEP 06

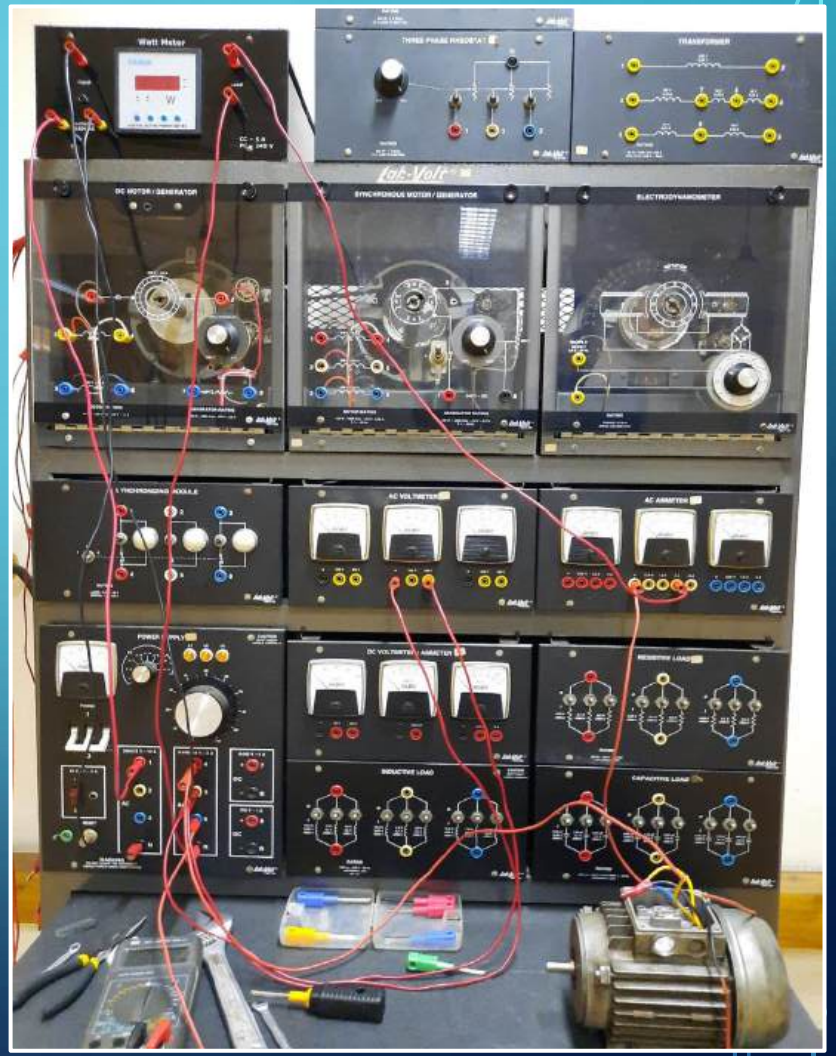
LABORATORY TEST

NO LOAD TEST EUIPMENTS

- Three Phase Induction Motor
- AC Ammeter
- AC Voltmeter
- Three Phase Wattmeter
- Power Supply
- Connection Leads

NO LOAD TEST PROCEDURE

- Connect instrument setup as shown in the image
- Apply rated voltage and frequency with no mechanical load
- Measure current, voltage and power



Current, Voltage & Power Measurement

VOLTAGE:400V

Apparent power,Snl=Vnl*Inl

=400*0.5

=200VA

CURRENT:0.5A

Reactive power,Qnl=√(Snl*Snl-Pnl*Pnl)

=√ (200*200-51*51)

=193.38VAR

POWER:17*3=51W

Total reactance,Xnl=(Qnl/(Inl*Inl))
=(193.38/(0.5*.05))
=773.55Ω

NO LOAD TEST

V = 400V

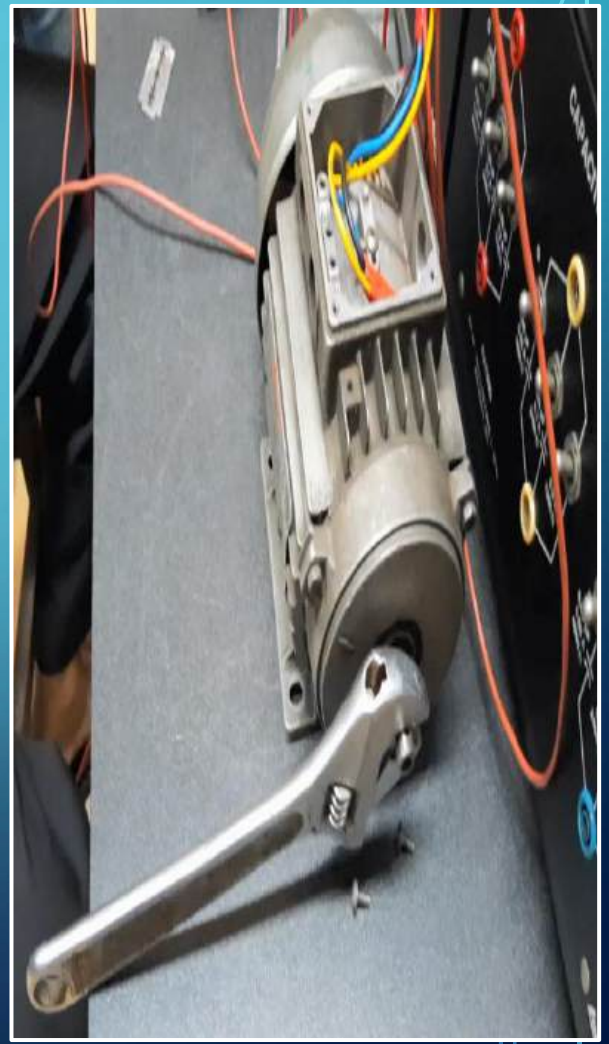
I= 0.5A

P=51 watt

P.F.= 51/ (√3x400x0.5)
=0.147

LOCKED ROTOR TEST PROCEDURE

- Connect ammeter, wattmeter, voltmeter as no load test
- Mechanically lock the motor rotor
- Adjust supply voltage until rated current flows
- Measure line to line voltage , line to line current and total power



Current, Voltage & Power Measurement

VOLTAGE:162V

Total resistance,Rbr=Vbr/Ibr

=162/0.7

=231.43Ω

CURRENT:0.7A

Total impedance,Zbr=Pbr/(Ibr*Ibr)

=51/(.7*.7)

=104.08Ω

POWER:51*3=153W

Total reactance=√(Zbr*Zbr-Rbr*Rbr)

=√(231.43*231.43-104.08*104.08) =206.71Ω

Locked Rotor Test

V = 162V

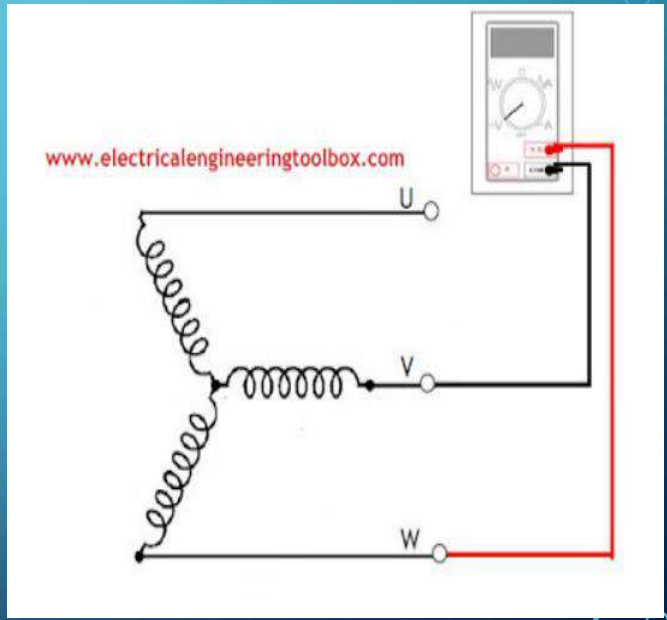
I= 0.7A

P= 153watt

P.F.= 153/ (√3x162x0.7)
=0.778

WINDING RESISTANCE TEST PROCEDURE:

- Touch the red (positive) lead of the multimeter to the positive end of the wire windings around the motor.
- Touch the black (negative) lead of the multimeter to the negative end of the wire windings around the motor.
- The reading that appears on the multimeter screen is the resistance in ohms



Resistance Measurement

COIL 1 : 64.6Ω **COIL 2 : 60.5Ω** **COIL 3 : 61.6Ω**

The winding resistance test is used to find open windings, shorts to ground, wrong turn count, wrong wire gauge, resistive connections, round wires in hand that are not connected in a coil, some connection mistakes, the resistance balance between phases, and in some cases shorted turns.

COST ANALYSIS

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Name of Product	Quantity	price
Copper wire P-31 (B.R.B)	.600 Kg	760
White Insulation Paper	.250 Kg	115
Burnish	1	30
Roll	1	10
	Total	**915**

DISCUSSION

In this project, we disassembled the motor into parts and reconstructed the motor from scratch and then performed tests on the new motor which assures us that rewinding of the motor was successful.

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THANK YOU