

Electromagnetic Braking System of an Induction Motor

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Abstract— The title of our project is “Electromagnetic Braking System Of Induction Motor” That means an induction motor to stop rotating via principle of electromagnetic and component to be used for stop rotating is electromagnetic brake. In this project electromagnetic brake is fitted on the shaft. When supply is given to the motor the motor is starts to rotating, When AC supply given to Electromagnetic brake the magnetic coil energizes and attract pressure disc so that the shaft of motor is free to rotate and motor is frequently rotate. When it’s necessary to stop rotation of the motor we need to apply the braking of motor. For the braking of motor the supply of electromagnetic brake is cut off and the pressure disc is release due to spring forces and disc is strongly connected with friction disc which made of carbon-fiber material and motor is stopped, because of friction disc is mounted on shaft and it also rotate with shaft when motor energize.

Key words: Electromagnet brake, Induction motor, Toggle switch, Push-Button switch

I. INTRODUCTION

Electromagnetic brakes are used when a load must be stopped rapidly to prevent it from rotating. Any emergency or accidentally case in industry this type of braking is more usefully.

In this project we are working on Braking system of induction motor with the help of electromagnetic brake. Braking application for electric motor is used widely around the world for equipment or machinery such as electric crane and Hoist, barrel machine electrical train, lift or for industrial drive.

Not all electric motor must have braking system. Normally it used for drive applications that have lot of energy stored in rotating part for equipment. It also used for driven system that required rapid deceleration and can controlled for accident or emergency situation.

II. BLOCK DIAGRAM

Figure show the circuit diagram of electromagnetic braking system of an induction motor. The induction motor and EM brake are connected as shown in circuit. The motor and EM brakes are mechanically coupled. The single phase ac supply is given to motor and rectifier using toggle switch. voltage is given to electromagnetic brake, and brake energizes and it will attract the pressure disc. When toggle switch ON position the motor and EM brake are energize. The push button switch is connected across toggle switch. This is bypass switch. When toggle switch is OFF the EM brakes is operates through this switch. The push button contacts is normally open type, when it’s pressed by manually the contacts of push button is normally closed and brake is energize.

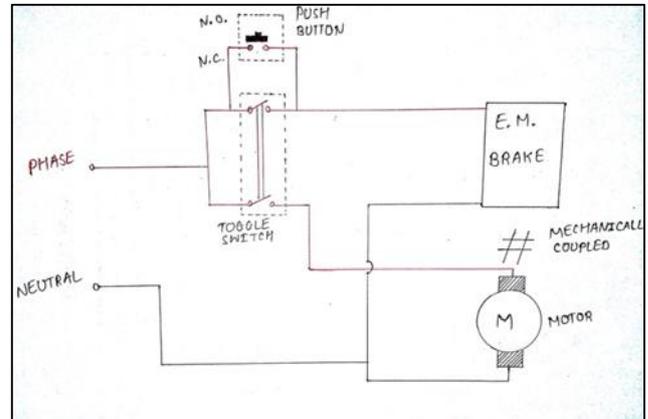


Fig. 1: Block diagram

III. WORKING

When no electricity is applied to the brake, a spring pushes against a pressure plate, squeezing the friction disc between the inner pressure plate and the outer cover plate. This frictional clamping force is transferred to the hub, which is mounted to a shaft.

Power off brakes stop or hold a load when electrical power is either accidentally lost or intentionally disconnected. In the past, some companies have referred to these as "fail safe" brakes. These brakes are typically used on or near an electric motor. For infallible operation of machinery, modern method are necessary, any machine which requires its motion to be controlled, whether it is a lifting crane, hoist, winch or mining haulage today employs an electromagnetic brake, enabling the operator not only to control the motion but also to hold the load at any desired point without danger of falling, merely by release of the starting handle. Electromagnetic brakes are used when a load must be stopped rapidly to prevent it from rotating. Electromagnetic brakes find its use in paper mills, drives of certain textile machines, sugar mill machinery, rubber mixing mills etc...

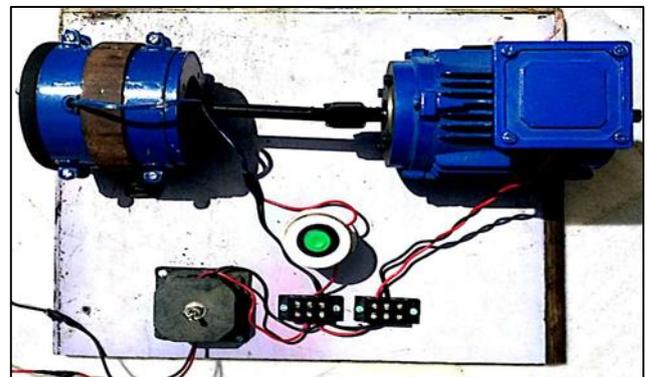


Fig. 2: Working model

IV. TYPES OF ELECTROMAGNET BRAKE

- 1) Single face brake
- 2) Power off brake
- 3) Particle brake
- 4) Hysteresis power brake
- 5) Multiple disc brake

In this project, we are using an electromagnet brake which is also known as "POWER OFF BRAKE" & "FAIL SAFE BRAKE". Failsafe Brake (Magnetic Disc Brake) are normally in the applied (braking) condition. When electric supply is given, the brake is released and the shaft free to rotate. In case of power failure or cut off, the brake is instantaneously applied thus preventing accidents.

Power off brakes stop or hold a load when electrical power is either accidentally lost or intentionally disconnected. In the past, some companies have referred to these as "fail safe" brakes. These brakes are typically used on or near an electric motor. Typical applications include robotics, holding brakes for Z axis ball screws and servo motor brakes. Brakes are available in multiple voltages and can have either standard backlash or zero backlash hubs. Multiple disks can also be used to increase brake torque, without increasing brake diameter.

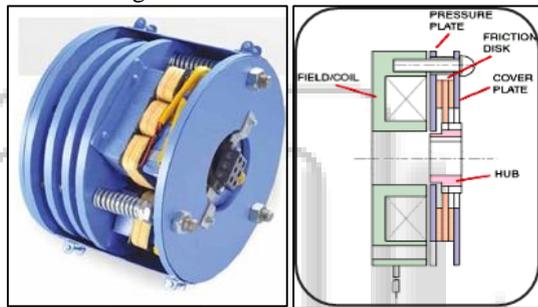


Fig. 3: Electromagnet brake

V. APPLICATIONS

- 1) Cranes and hoists
- 2) Belt conveyors
- 3) Textile machinery
- 4) Material handling equipment
- 5) Rolling mills equipments
- 6) Elevators

VI. CONCLUSION

We concluded from this project that, study of different types of brakes used in induction motor we have concluded that the electromagnetic braking system is the most efficient and safe system. We have studied in deep the concept of electromagnetism of electromagnetic brakes and its working.

There are many applications of our project like Hoist, crane, textile machinery etc... And we are also used for safety purpose.

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