



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EC309 ELECTRICAL MACHINES AND POWER SYSTEMS

II YEAR / 03 SEMESTER MECH & MCT

Unit 4 – SPECIAL MACHINES

Repulsion Motor

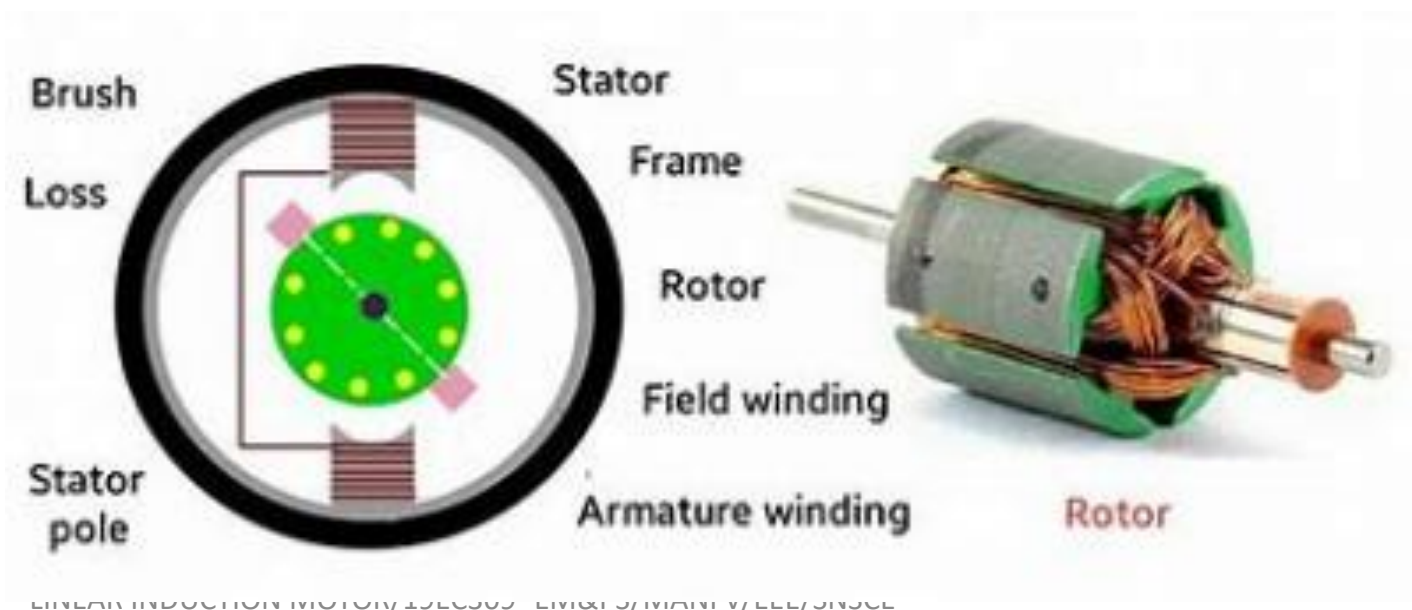


Repulsion Motor

- ✓ It is a special kind of single-phase AC motor which works via the repulsion of similar poles.
- ✓ In the past, these motors were used as traction motors in electric trains; however, they have been outdated by recent types of electric motors.
- ✓ A single-phase commutator-type motor with a wound rotor and brush configuration is known as a repulsion motor.
- ✓ It is based on the magnetic repulsion between two poles.
- ✓ The use of a [Repulsion Motor](#) is essential while using Industrial Tools.



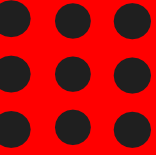
- ✓ A repulsion motor is a single-phase electric motor that operates by providing input AC.
- ✓ It starts as a repulsion motor and runs as an induction motor, where the starting torque should be high for a repulsion motor and very good running characteristics for an induction motor.
- ✓ In repulsion motor direction of rotation of the motor is the same as that of brush shift.





Construction

- ✓ The repulsion motor is equipped with the stator, rotor, and commutator brush assembly.
- ✓ The stator carries a single-phase exciting winding similar to the main winding of a single-phase induction motor.
- ✓ The rotor has distributed DC winding connected to the commutator at one end just like in the DC motor.
- ✓ The carbon brushes are short-circuited on themselves and find a use for conducting current using the armature.





Working principle

- ✓ The basic principle behind the working of repulsion motor is that “similar poles repel each other.”
- ✓ This means two North poles will repel each other. Similarly, two South poles will repel each other.
- ✓ When the repulsion motor winding is supplied with single-phase AC, it produces a magnetic flux along the direct axis.
- ✓ When this magnetic flux links with the rotor winding, it creates an EMF. Due to this EMF, a rotor current is produced.
- ✓ This rotor current in turn produces a magnetic flux that is directed along the brush axis due to commutator assembly.
- ✓ Due to the interaction of stator and rotor produced fluxes, an electromagnetic torque is produced.



Types of repulsion motors

There are three types of repulsion motor they are

1. Compensated repulsion motor
2. Repulsion-start induction motor
3. Repulsion induction motor



Compensated repulsion motor

- ✓ It is provided with an additional winding, called the compensating winding, to improve power factor and provide better speed regulation.
- ✓ This winding is much smaller than the stator winding and is usually wound in the inner slots of each main pole and is connected in series with a rotor through an additional set of brushes placed midway between the usual short-circuited brushes.
- ✓ A compensated type motor finds use where there is a need for high power at the same speed.





Repulsion start induction motor

- ✓ As the name implies the repulsion-start induction motor starts as a repulsion motor and runs as an induction motor.
- ✓ The general construction of this motor is quite similar to a repulsion motor.
- ✓ The only difference is that in addition to the basic repulsion motor construction it is equipped with a centrifugal device which operates at about 75-80 percent of synchronous speed and short circuits all of the commutator segments.
- ✓ The repulsion start induction motor combines the desirable starting characteristics of the repulsion motor with the operating characteristic of the induction motor.
- ✓ Such motors are suitable for commercial refrigerators, compressors, pumps, hoists, and other constant speed drives, particularly those which have high inertia and a prolonged starting period.
- ✓ This kind of repulsion motor price is high, this device does save wear and tear on brushes and runs quietly.



Repulsion induction motor

- ✓ According to the characteristics of the repulsion induction motor, it has a single-phase stator winding, as a repulsion-start induction motor has, but it has two separate and independent windings on the rotor in common slots.
- ✓ The inner winding is a squirrel cage winding with rotor bars permanently short-circuited, while the outer winding is a repulsion or commutator winding similar to a dc armature winding.
- ✓ When the motor starts, the [squirrel cage](#) winding, due to its high reactance, does not affect and the motor starts as a repulsion motor.
- ✓ Such a motor finds a use for applications requiring a high starting torque with essentially a constant running speed.
- ✓ Common applications are household refrigerators, garage air pumps, gasoline pumps, compressors, etc.



Repulsion Motor Applications

- Applications of Farm Motors
- Film winding machines
- Hoists
- Machines in Textile
- Machines for floor maintenance
- Printing presses
- Air compressors
- Pumps & Fans
- Laundry equipment
- High-speed lifts
- Mixing machines
- Machine tools
- Air pump
- Mining tools
- Petrol pumps
- Drive compressors



Advantages

- ✓ Excellent beginning torque, low starting current, and a wide range of speed control with smooth speed fluctuation

Disadvantages

- ✓ At lower speeds, the power factor is much lower.
- ✓ Brushes and commutators quickly exhaust owing to heat production and arcing at the brush assembly.

