

A **3 phase squirrel cage induction motor** is a type of three phase induction motor which functions based on the principle of electromagnetism. It is called a 'squirrel cage' motor because the rotor inside of it – known as a 'squirrel cage rotor' – looks like a squirrel cage.//This rotor is a cylinder of steel laminations, with highly conductive metal (typically aluminum or copper) embedded into its surface. When an alternating current is run through the stator windings, a rotating magnetic field is produced.// **Squirrel Cage Induction Motor Working Principle**-When a 3 phase supply is given to the stator winding it sets up a rotating magnetic field in space. This rotating magnetic field has a speed which is known as the synchronous speed.//This rotating magnetic field induces the voltage in rotor bars and hence short-circuit currents start flowing in the rotor bars. These rotor currents generate their self-magnetic field which will interact with the field of the stator. Now the rotor field will try to oppose its cause, and hence rotor starts following the rotating magnetic field.//The moment rotor catches the rotating magnetic field the rotor current drops to zero as there is no more relative motion between the rotating magnetic field and rotor. Hence, at that moment the rotor experiences zero tangential force hence the rotor decelerates for the moment.//**Squirrel Cage Induction Motor**After deceleration of the rotor, the relative motion between the rotor and the rotating magnetic field reestablishes hence rotor current again being induced. So again, the tangential force for rotation of the rotor is restored, and therefore again the rotor starts following rotating magnetic field, and in this way, the rotor maintains a constant speed which is just less than the speed of rotating magnetic field or synchronous speed.//Slip is a measure of the difference between the speed of the rotating magnetic field and rotor speed. The frequency of the rotor current = slip  $\times$  supply frequency// **Definition: A slip ring induction motor** is referred to as an asynchronous motor as the speed at which it operates is not equal to the synchronous speed of a rotor. The rotor of this type of motor is wound type. It comprises of a cylindrical laminated steel core and a semi-closed groove at the outer boundary to accommodate a 3-phase insulated winding circuit.// the rotor is wound to match the number of poles on the stator. The three terminals of a rotor and three start terminals connecting through slip rings are connected to a shaft. The aim of the shaft is to transmit mechanical power.// This motor runs on the principle of Faraday's law of electromagnetic induction. When a stator winding is excited with an AC supply, the stator winding produces magnetic flux. Based on Faraday's law of electromagnetic induction, the rotor winding gets induced and generates a current of magnetic flux. This induced EMF develops torque that enables the rotor to rotate.//However, the phase difference between the voltage and current do not meet the requirements to generate high starting torque as torque developed is not unidirectional. The external resistance of high value is connected with the circuit to improve the phase difference of a motor. As a result, inductive reactance and phase difference between I and V is reduced. Consequently, this reduction helps the motor to generate high starting torque.// **Slip** is defined as the difference between the flux speed and the rotor speed. For an induction motor to produce torque, at least some difference should be there between stator field speed and rotor speed. This difference is called 'slip'. **The Slip Ring** is an electromechanical device that aids in transmitting power and electrical signals from stationary to a rotating component.//Slip rings are also known as rotary electrical interfaces, electric rotary joints, swivels, or collector rings. Sometimes, based on the application, the slip ring requires higher bandwidth to transmit data. Slip rings improve the efficiency and performance of a motor by improving system operation and eliminating wires that are dangling from motor joints.