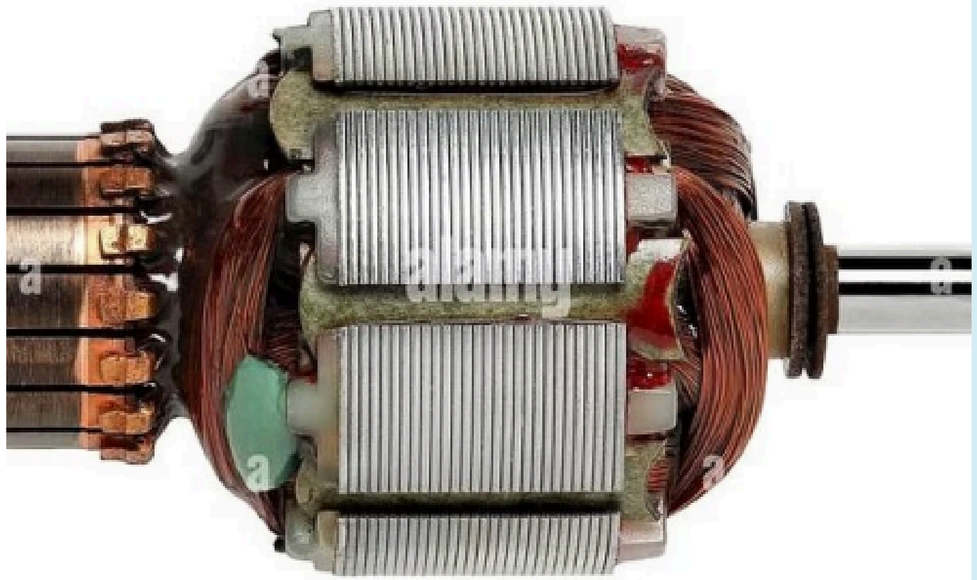
Construction of DC motor

23EG105H33-K.YUVRAJ
23EG105H06-B.UDAY

DC Motors

DC motors are electromechanical devices that convert electrical energy into mechanical energy. They are widely used in various industrial and consumer applications due to their precise speed and torque control, as well as their ability to operate over a wide range of speeds.



Construction of DC Motors

Stator

The stator is the stationary part of the motor, responsible for creating a magnetic field that interacts with the rotor.

Rotor

The rotor is the rotating part of the motor, which generates its own magnetic field and interacts with the stator's field to produce torque.

Commutator and Brushes

The commutator and brushes facilitate the flow of current to the rotor, enabling the continuous rotation of the motor.

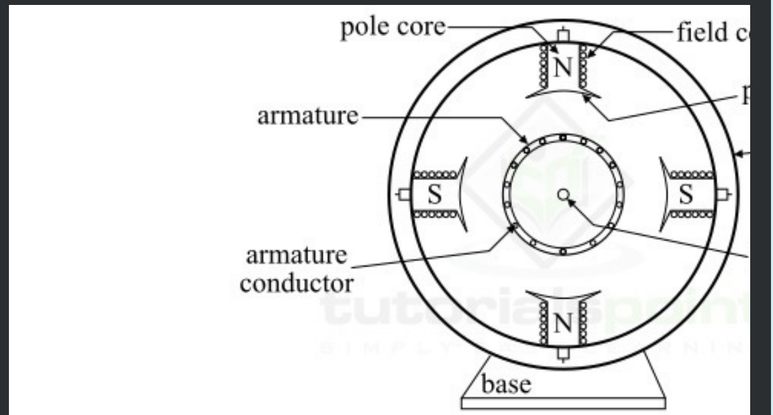


Figure - DC Machine Constructio

Principle::of::Operation

1

Magnetic Field

The stator's magnetic field interacts with the rotor's magnetic field, creating a torque that causes the rotor to spin.

2

Current Flow

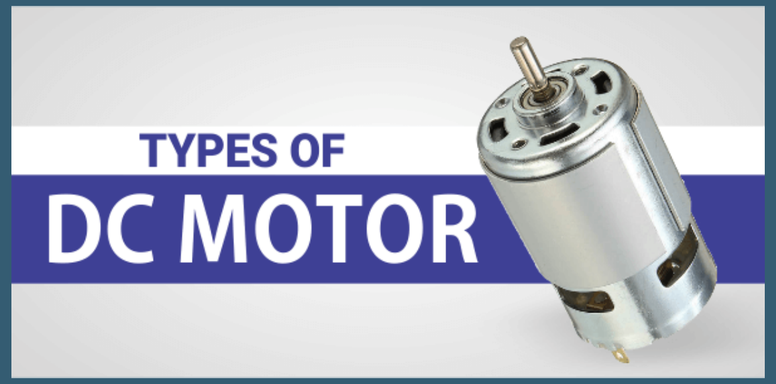
The commutator and brushes ensure that the current flows through the rotor windings in a way that maintains the rotating magnetic field.

3

Electromagnetic Interaction

The interaction between the stator's and rotor's magnetic fields results in the production of mechanical force, which causes the rotor to rotate.

Types of DC Motors



1 **Shunt-Wound DC Motor**

The stator and rotor windings are connected in parallel, providing constant speed and higher starting torque.

2 **Series-Wound DC Motor**

The stator and rotor windings are connected in series, offering high starting torque but variable speed characteristics.

3 **Compound-Wound DC Motor**

A combination of shunt and series windings, offering the benefits of both types for more versatile applications.

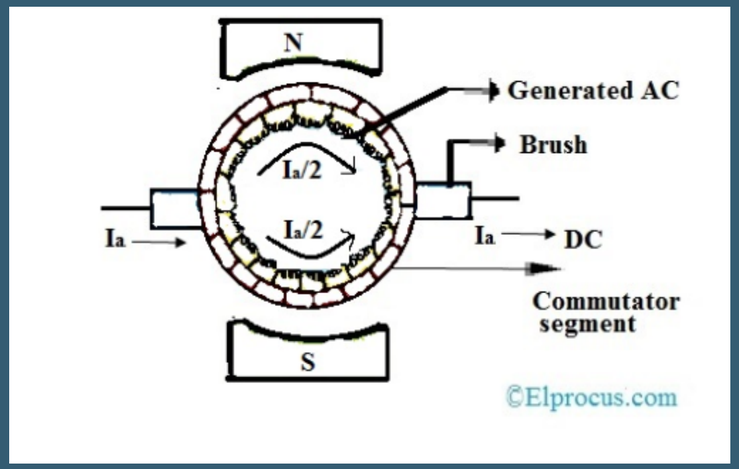
Armature::Winding::and::Commutation

Armature Winding

The armature winding is the rotor coil that carries the current and interacts with the stator's magnetic field.

Commutation

The commutator and brushes ensure the reversal of the current in the armature winding, allowing for continuous rotation.



Efficiency

The design of the armature winding and commutation system significantly impacts the overall efficiency and performance of the DC motor.

Torque and Speed Characteristics

1

Torque Curve

DC motors exhibit a characteristic torque curve, where torque is inversely proportional to speed, allowing for precise control.

2

Speed Regulation

The speed of a DC motor can be easily controlled by adjusting the voltage or current supplied to the armature.

3

Load Characteristics

The torque and speed of a DC motor depend on the load applied, making them suitable for a wide range of applications.

Applications of DC Motors

Industrial

DC motors are widely used in industrial applications, such as robotics, automation, and machine tools.

Household

DC motors are found in various household appliances, including fans, washing machines, and power tools.

Transportation

DC motors are used in electric vehicles, marine propulsion systems, and aerospace applications.

Medical

DC motors are employed in medical equipment, such as hospital beds, surgical tools, and prosthetic devices.

Advantages and Limitations

Advantags

- Precise speed and torque control
- Wide range of speed and torque characteristics
- Relatively simple construction and maintenance
- Reliable and durable performance
-

Limitations

- Limited efficiency compared to AC motors
- Susceptibility to commutator and brush wear
- Higher maintenance requirements due to moving parts
- Limited power output for larger applications
-

thank you