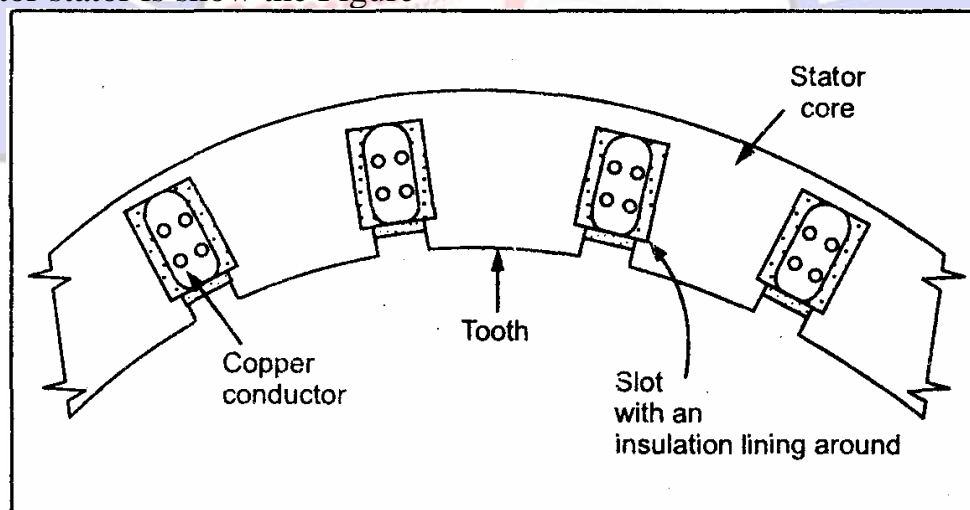


1-3 Construction of Synchronous Machines

In a synchronous generator, a DC current is applied to the rotor winding producing a rotor magnetic field. The rotor is then turned by external means producing a rotating magnetic field, which induces a 3-phase voltage within the stator winding.

STATOR

1. The stator is a stationary armature.
2. This consists of a core and the slots to hold the armature winding similar to the armature of a d.c. generator.
3. The stator core uses a laminated construction.
4. It is built up of special steel stampings insulated from each other with varnish or paper.
5. The laminated construction is basically to keep down eddy current losses.
6. Generally choice of material is steel to keep down hysteresis losses.
7. The entire core is fabricated in a frame steel plates.
8. The core has slots on its periphery housing the armature conductors.
9. Frame does carry any flux and serve the support to the core.
10. Ventilation is maintained with the help of holes in the frame. The section of an alternator stator is shown in the Figure

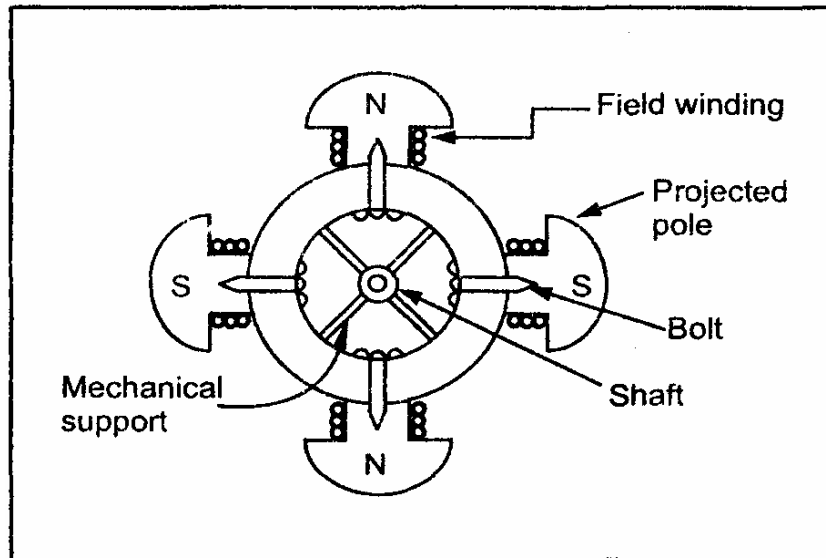


ROTOR

There are two types of rotors used in alternators,

- i) Salient pole type
- ii) Smooth cylindrical type.

SALIENT POLE TYPE ROTOR



1. This is also called projected pole type as all the poles are projected out from the surface of the rotor.
2. The poles are built up of thick steel laminations.
3. The poles are bolted to the rotor as shown in the Figure.
4. The field winding is provided on the pole shoe. These rotors have large diameter and small axial lengths.
5. The limiting factor for the size of the rotor is the centrifugal force acting on the member of the machine.
6. As mechanical strength of salient pole type is less, this is preferred for low speed alternators ranging from 125 r.p.m. to 500 r.p.m. The prime movers used to drive such rotor are generally water turbines.

SMOOTH CYLINDRICAL TYPE ROTOR

1. This is also called non salient type or non-projected pole type of rotor.
2. The rotor consists of smooth solid steel cylinder, having number of slots accommodate the field coil.
3. The slots are covered at the top with the help of steel or manganese wedge.
4. The un-slotted portions of the cylinder itself act as the poles.
5. The poles are not projecting out and the surface of the rotor is smooth which maintains uniform air gap between stator and the rotor.
6. These rotors have small diameters and large axial lengths.
7. This is to keep peripheral speed within limits.
8. The main advantage of this type is that these are mechanically very strong and thus preferred for high speed alternators ranging between 1500 to 3000 r.p.m.
9. Such high speed alternators are called 'turbo alternators'.
10. The prime movers used to drive such type of rotors are generally steam turbines, electric motors.

