DIFFERENCE BETWEEN SALIENT AND CYLINDRICAL TYPE OF ROTOR

Salient Pole Type	Smooth Cylindrical Type
1 Poles are projecting out from the surface.	1. Unslotted portion of the cylinder acts as poles hence poles are non projecting.
2 Air gap is non uniform.	2. Air gap is uniform due to smooth cylindrical periphery.
3 Diameter is high and axial length is small.	3. Small diameter and large axial length is the feature.
4. Mechanically weak.	4. Mechanically robust.
5. Preferred for low speed alternators.	5. Preferred for high speed alternators i.e. for turboalternators.
6. Prime mover used are water turbines, I.C. engines.	6. Prime movers used are steam turbines, electric motors.
7. For same size, the rating is smaller than cylindrical type.	7. For same size, rating is higher than salient pole type.
8. Separate damper winding is provided.	8. Separate damper winding is not necessary.

- Field windings are the windings producing the main magnetic field (rotor windings)
- armature windings are the windings where the main voltage is induced (stator windings)

The rotor of a synchronous machine is a large electromagnet. The magnetic poles can be either salient (sticking out of rotor surface) or non-salient construction. Rotors are made laminated to reduce eddy current losses.

Two common approaches are used to supply a DC current to the field circuits on the rotating rotor:

1. Supply the DC power from an external DC source to the rotor by means of slip rings and brushes;

2. Supply the DC power from a special DC power source mounted directly on the shaft of the machine.

Slip rings are metal rings completely encircling the shaft of a machine but insulated from it. Graphite-like carbon brushes connected to DC terminals ride on each slip ring supplying DC voltage to field windings.

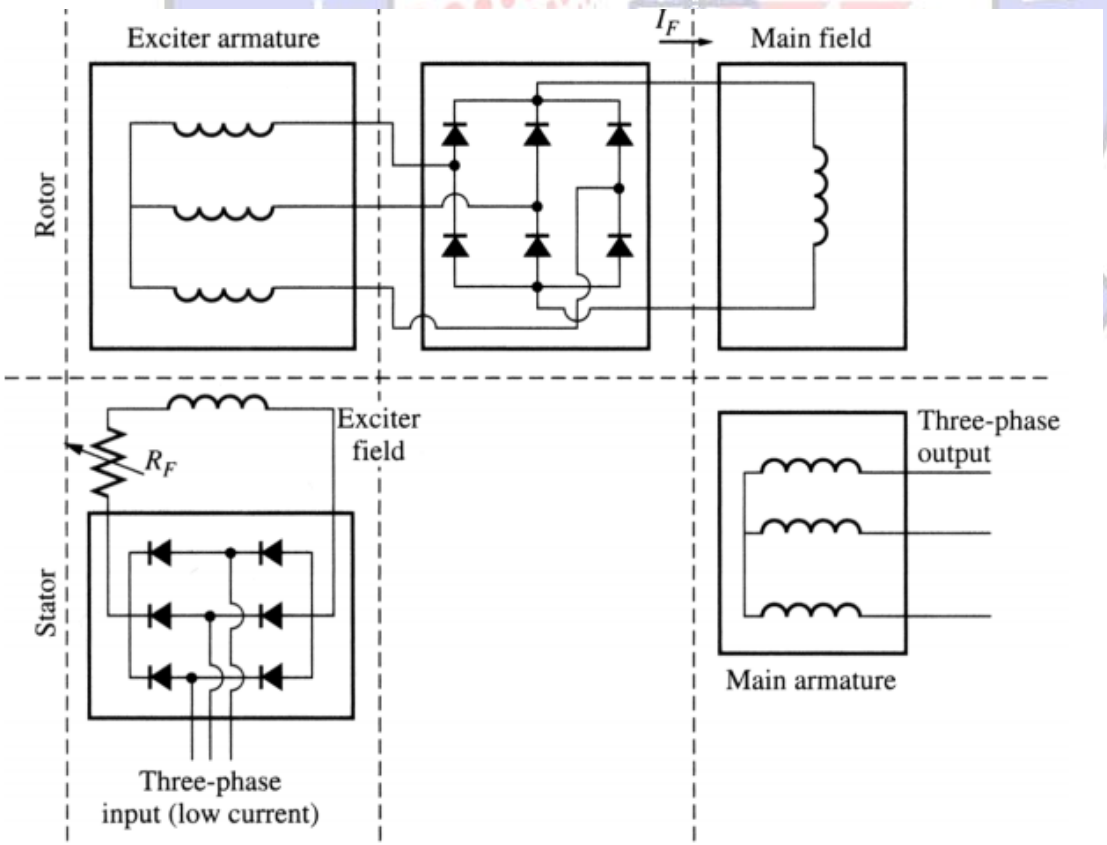
On large generators and motors, brushless exciters are used.

• A brushless exciter is a small AC generator whose field circuits are mounted on the stator and armature circuits are mounted on the rotor shaft.

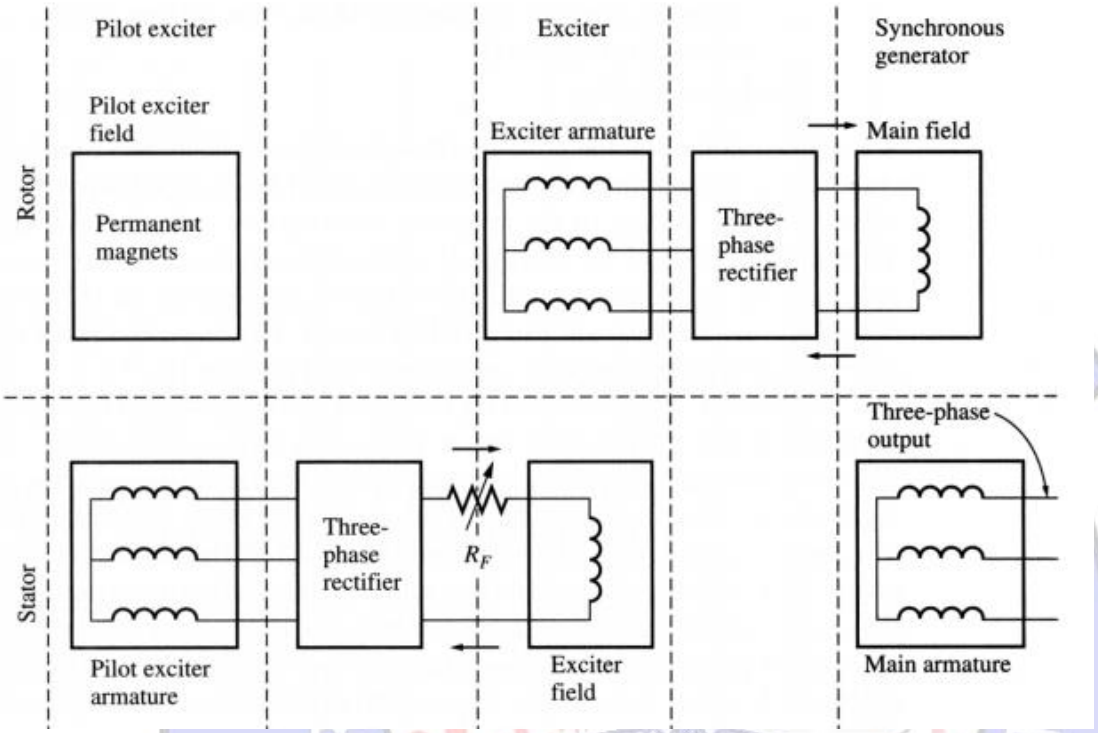
• The exciter generator's 3-phase output is rectified to DC by a 3-phase rectifier (mounted on the shaft) and fed into the main DC field circuit.

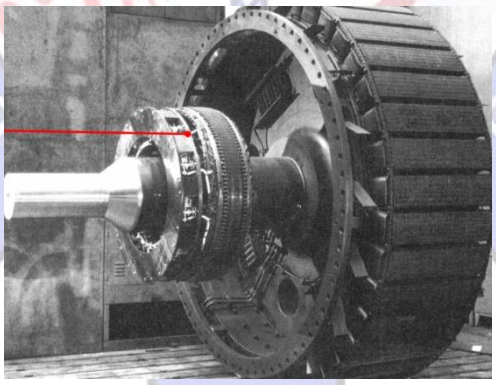
• It is possible to adjust the field current on the main machine by controlling the small DC field current of the exciter generator (located on the stator).

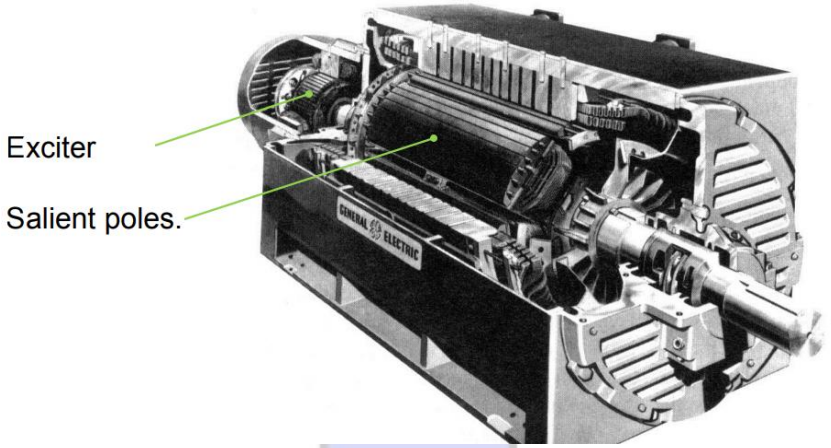
A brushless exciter: a low 3-phase current is rectified and used to supply the field circuit of the exciter (located on the stator). The output of the exciter's armature circuit (on the rotor) is rectified and used as the field current of the main machine.



To make the excitation of a generator completely independent of any external power source, a small pilot exciter is often added to the circuit. The pilot exciter is an AC generator with a permanent magnet mounted on the rotor shaft and a 3-phase winding on the stator producing the power for the field circuit of the exciter.







A rotor of large synchronous machine with a brushless exciter mounted on the same shaft