

TYPES OF SYNCHRONOUS MACHINES

Generators:-

⦿ Hydro-generators (Salient Pole Type):

- The Synchronous generators driven by water turbines are known as hydro generators or Water wheel generators
- They have rating upto 750 MW and are driven at speeds ranging from 100 to 1000 RPM

⦿ Turbo-alternators (Cylindrical Rotor Type or Wound Rotor Type):

- They are driven by steam turbines
- The efficiency of steam turbine is high at large speeds, the turbo-alternators are designed for speed upto 3000 RPM. Turbo-alternators have ratings upto 1000MW

TYPES OF SYNCHRONOUS MACHINES

- Also Synchronous motors prove to be cheaper than induction motors for high power low speed applications
- The applications of Synchronous machines include constant speed drives for compressors, blowers, low head pumps

● Compensators:

- Synchronous compensators are used for control of reactive power in power supply networks
- They are designed for ratings upto 100 MVA and speed upto 3000 RPM

TYPES OF SYNCHRONOUS MACHINES

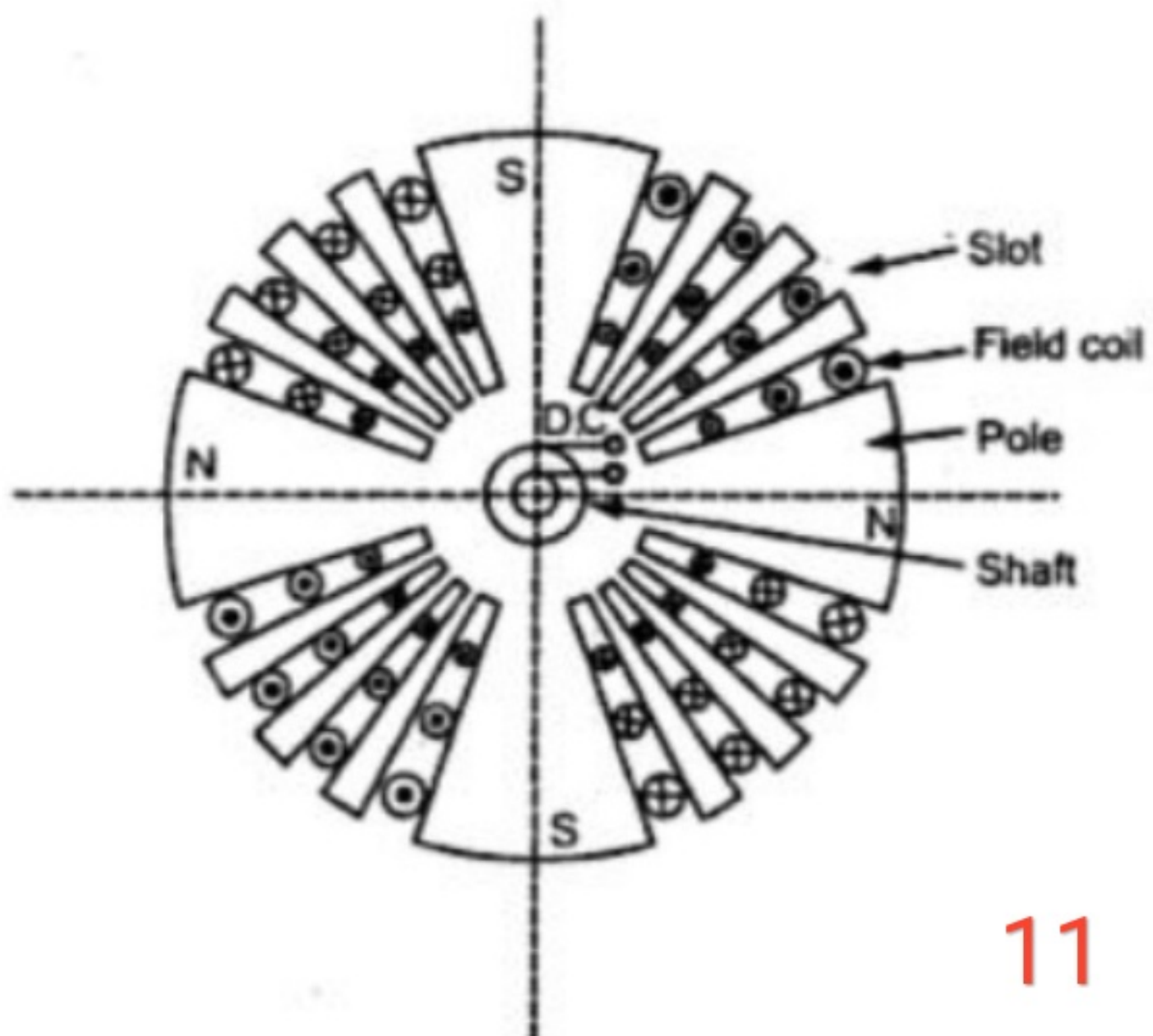
Synchronous generators are classified in two category **according to its rotor construction:**

- ⦿ 1) Cylindrical Rotor Type
- ⦿ 2) Salient pole Rotor Type

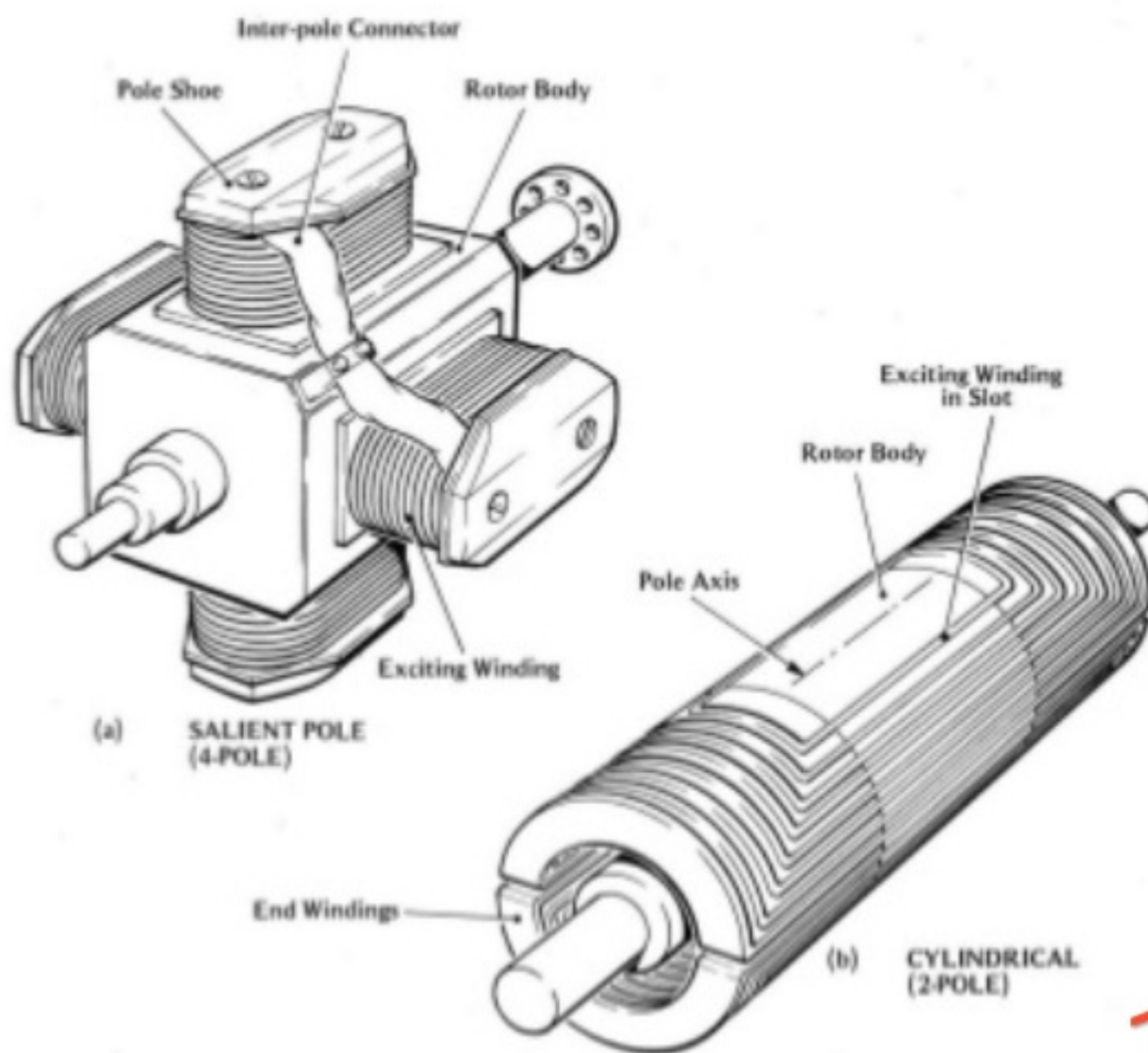
⦿ Cylindrical Rotor Type:-

- ❖ This type machines are High speed machines (1000 to 3000 RPM)
- ❖ This type machine has Small diameter and is large axial length
- ❖ This type of machines are used in Thermal power plant and gas turbine power plant Where speed requires high

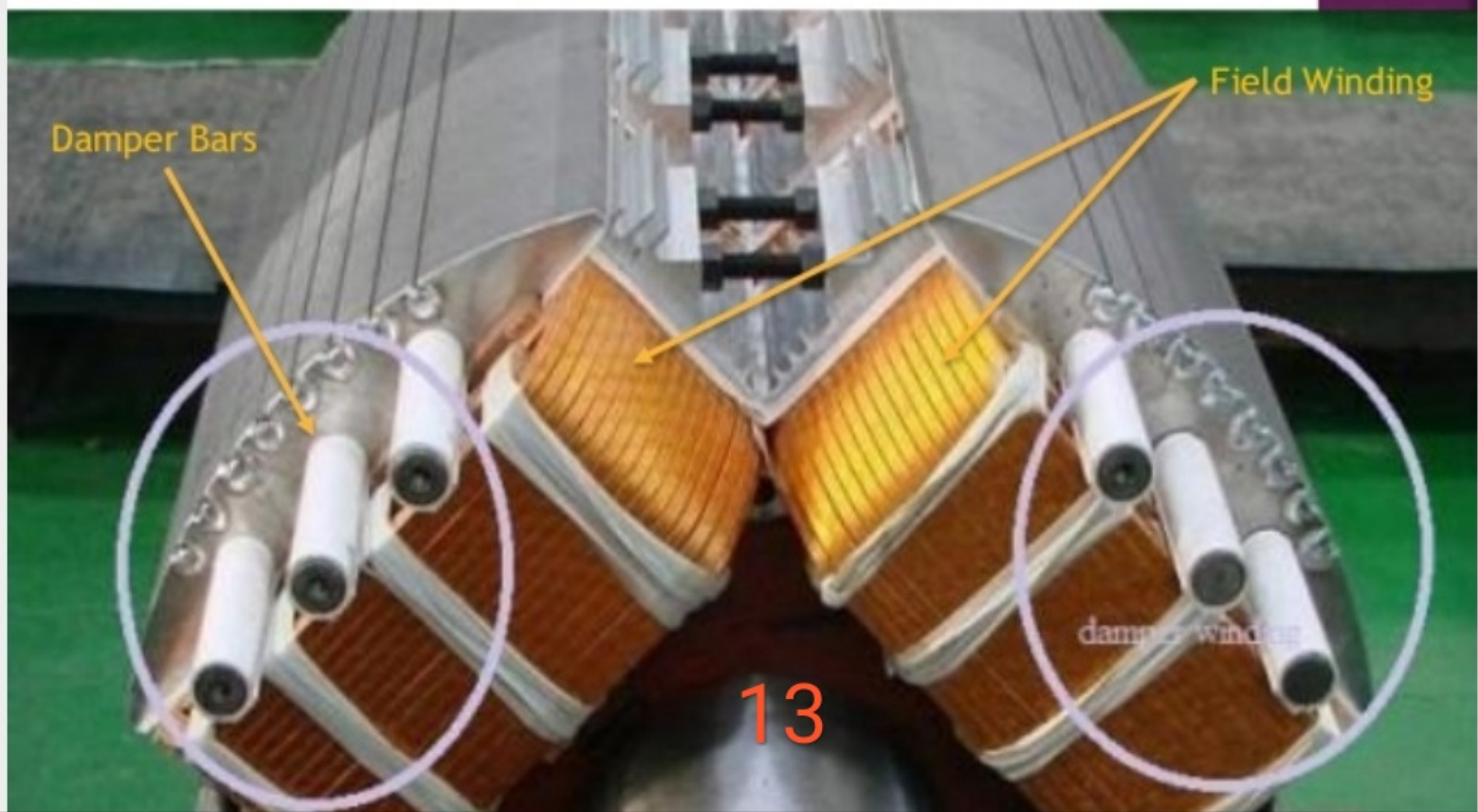
CYLINDRICAL ROTOR



CYLINDRICAL ROTOR & SALIENT POLE ROTOR



DAMPER WINDING



CYLINDRICAL ROTOR & SALIENT POLE ROTOR

Cylindrical rotor:-

- ⦿ Cylindrical rotor does not have poles that are projecting out.
- ⦿ The air gap between the stator and rotor is uniform.
- ⦿ The smooth cylindrical rotor has small no of poles.
- ⦿ Cylindrical rotors are mechanically strong.
- ⦿ They have small diameters and large axial length.
- ⦿ The prime movers used are steam turbines and electric motors.
- ⦿ They are preferred for high speed alternators which range from 1000 to 3000 RPM

CYLINDRICAL ROTOR & SALIENT POLE ROTOR

Salient Pole rotor:-

- ◉ Salient pole rotor does have poles that are projecting out from surface.
- ◉ The air gap between the stator and rotor is non-uniform.
- ◉ The salient pole rotor has large no of poles.
- ◉ Saline Pole rotors are mechanically weak.
- ◉ They have large diameters and small axial length.
- ◉ The prime movers used are IC engines and law speed turbine.
- ◉ They are preferred for law speed alternators which range from 100 RPM to 500 RPM

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