Special Electrical Machines

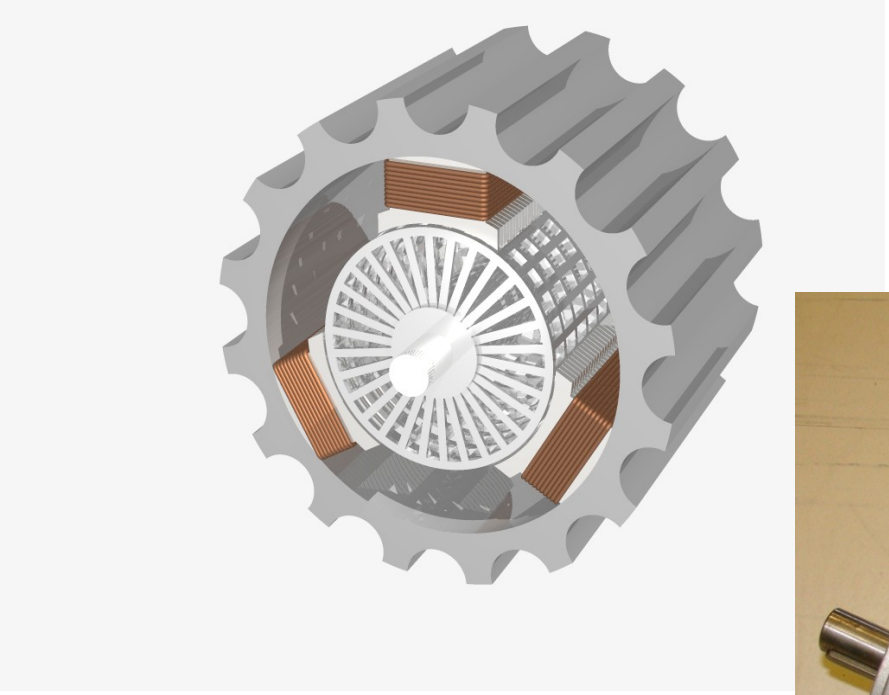
Unit 1

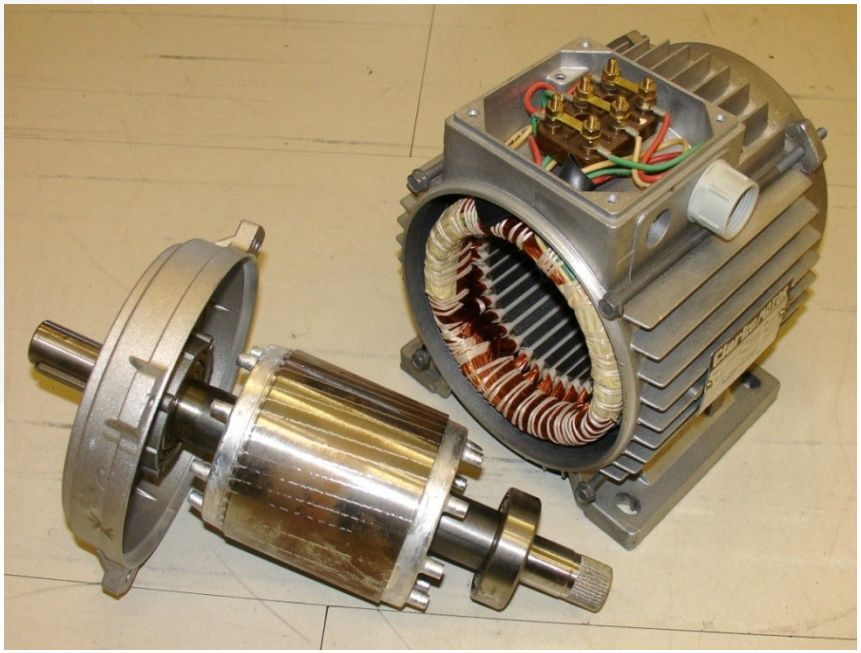
Poly-phase AC Machines

Poly-phase AC Machines

- Construction and performance of double cage three phase induction motors
- Construction and performance of Deep bar three phase induction motors
- e.m.f. injection in rotor circuit of slip ring induction motor,
- concept of constant torque and constant power controls,
- static slip power recovery control schemes (constant torque and constant power)

Induction Machines



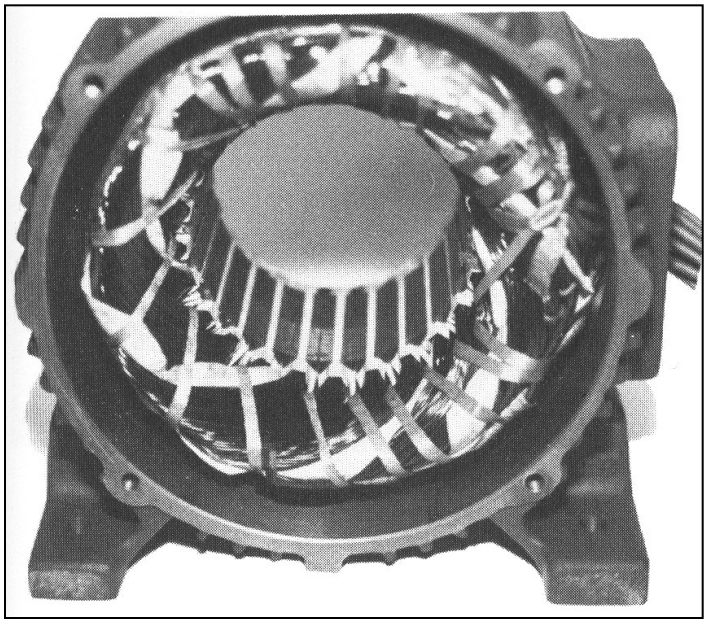


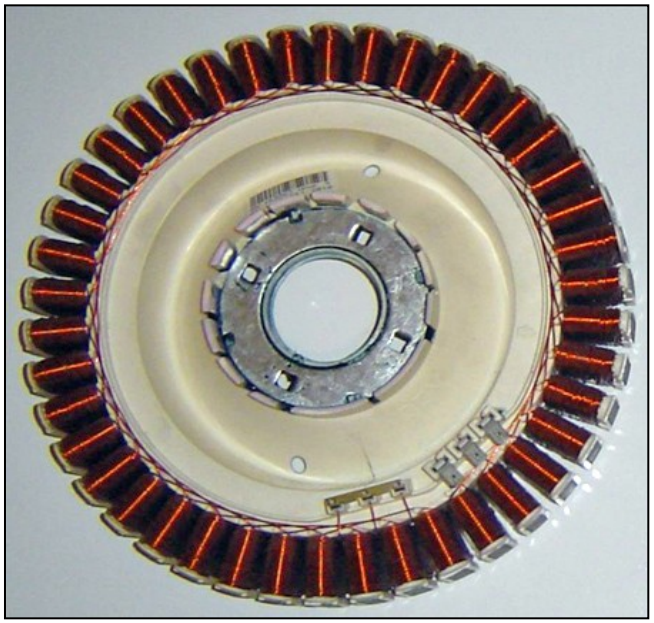
Introduction

- Most industrial motors are squirrel cage induction machines because of their simple and robust construction, low cost, minimal maintenance, and inherent overload protection.
- However, induction generators are much less widely used because the drive speed, electrical frequency, voltage, load, and equivalent terminal capacitance must be juggled to provide both the reactive excitation power to the machine and the varying real power to the load.
- This type of generator is not widely used outside the wind turbine industry, and in small hydropower units

Construction

- An induction machine has two main parts
  - a stationary stator
    - consisting of a steel frame that supports a hollow, cylindrical core
    - core, constructed from stacked laminations, having a number of evenly spaced slots, providing the space for the stator winding





Stator of IM

Construction

- a revolving rotor
  - composed of punched laminations, stacked to create a series of rotor slots, providing space for the rotor winding
  - one of two types of rotor windings
  - conventional 3-phase windings made of insulated wire (wound-rotor) » similar to the winding on the stator
  - aluminum bus bars shorted together at the ends by two aluminum rings, forming a squirrel-cage shaped circuit (squirrel-cage)
- Two basic design types depending on the rotor design
  - squirrel-cage: conducting bars laid into slots and shorted at both ends by shorting rings.
  - wound-rotor: complete set of three-phase windings exactly as the stator. Usually Y-connected, the ends of the three rotor wires are connected to 3 slip rings on the rotor shaft. In this way, the rotor circuit is accessible.

THANKS….

Queries Please…