2.6 ROTOR POSITION SENSOR

Rotor position information is important for the operation of SRM.Rotor angle information must be accurate for the high speed drives. Inaccurate position sensing results in decreased torque &efficiency. In high speed motors, error in 1° decreases the torqueby8%.Position sensing sensor is enough.

Disadvantages of electro mechanical sensors are:

Unreliable due to dust, high temperature, humidity, vibration.

Cost increases with resolution.

Additional manufacturing expenses.

Extra electrical connections.

Need more space at the shaft.

To over come the above problems, sensor less rotor position estimation methods are developed. Sensor less methods employs motor electrical parameters for position detection.

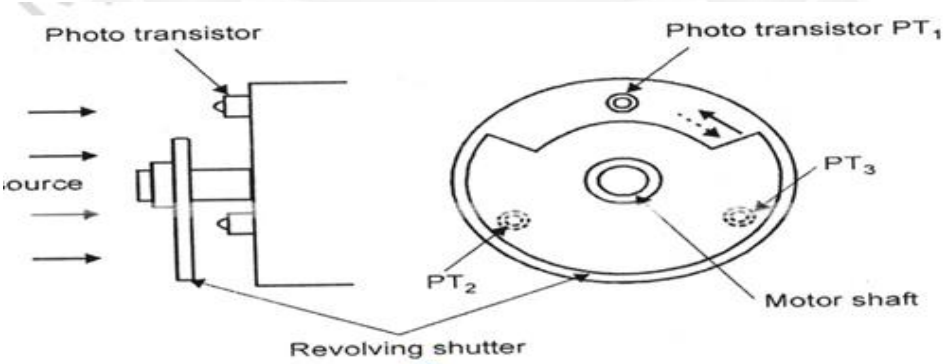

Fig.opticalposition sensor

Fig.opticalposition sensor

1. HALLPOSITION SENSOR:

- Based on Hall principle.
- On rotor shaft, 3hall components, rotating plate with permanent magnet.
- Output of hall components indicates the rotor position.

  - ❖ Observer based sensing methods
  - ❖ Incremental inductance based sensing
  - ❖ Direct inductance based sensing
  - ❖ Intelligent control based sensing methods

Observer based sensing methods:

Use a state observer or a sliding mode observer

Depends on the inductances lope for their convergence and functioning.

Computationally intensive and have the problem of convergence

2.7 MICROPROCESSOR OR COMPUTER BASED CONTROL OF SRM DRIVE

Today in industrial places there is high demands on control accuracies, flexibility, ease of operation, repeatability of parameters for many drive applications.

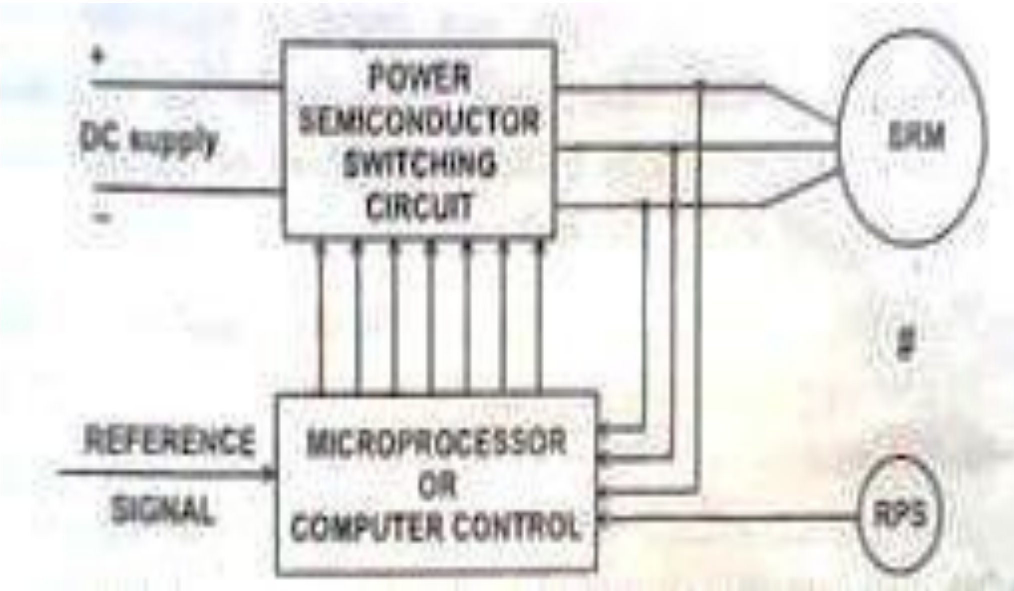

Figure 2.7.1 Block Diagram of the microprocessor control of srm
[Source: "special electric machines" by R.Srinivasan page:3.59]

Nowadays switched reluctance motors are increasingly used in industries. To meet the above requirements, uses of microprocessor have become important.

Microprocessor or computer based control of SRM Fig.2.7.1 shows the block diagram of microprocessor based control of SRM drive. This control system consists of power semiconductor switching circuit, SRM with rotor position sensor and microprocessor system.

In this system microprocessor acts as a controller for the switched reluctance motor and generate control pulses to the power semiconductor switching circuits.

The input DC supply is fed to the power semiconductor switching circuits. Different types of power semiconductor switching circuits are used for different application. Normally the circuits are inverter circuit configuration.

The power semiconductor devices are turned on and off by controller circuit. Here the controller circuit is microprocessor or computer based control system. In the SRM drive shown in fig. 2.7.1, the rotor position sensor gives the information about the rotor with respect to the reference axis to the microprocessor or computer control. The controller also receives the status of current, flow through the phase winding and reference signal.

The microprocessor or computer compares the signals obtained from the RPS and reference and generate square pulses to the power semiconductor devices. This signal is fed to the inverter circuit. The phase winding of the SRM is energized depending upon the turning on and off of the power semiconductor switching circuit.

The microprocessor or computer controller can perform the following functions.

a) Control the feedback loops.

b) PWM or square wave signal generation to inverters.

c) Optimal and adaptive control.

d) Signal monitoring and warning.

e) General sequencing control.

f) Protection and fault overriding control.

g) Data acquisition.

The superiority of microprocessor or computer control over the conventional hardware based control can be easily recognized for complex drive control system. The simplification of hardware saves control electronics cost and improves the system reliability. The digital control has inherently improves the noise immunity which is particularly important because of large power switching transients in the converters.