SNS COLLEGE OF TECHNOLOGY

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Coimbatore-641035

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

19EET301 / POWER ELECTRONICS AND DRIVES

III YEAR / V SEMESTER

UNIT – IV : PART A - INTRODUCTION TO ELECTRIC DRIVES

BASIC ELEMENTS AND ADVANTAGES

TOPIC OUTLINE

What we'll discuss?

Basic elements

Block diagram

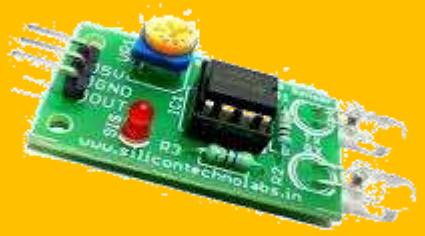
Identifying the elements

Case study

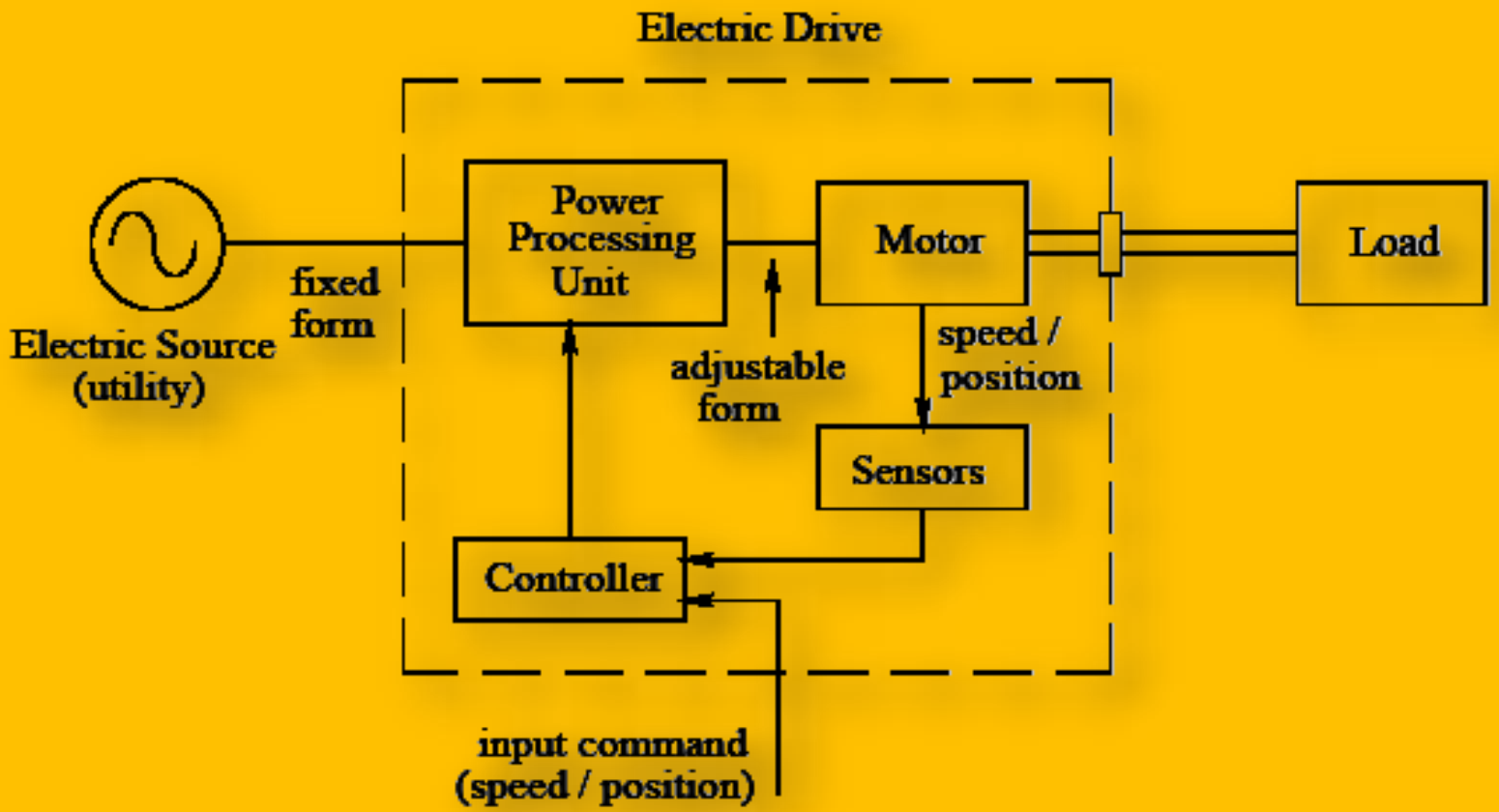
Advantages

BASIC ELEMENTS OF AN ELECTRIC DRIVE

- **Electric Motor**
- **Power Modulator**
- **Controller**
- **Sensor**
- **Source**
- **Load**



BLOCK DIAGRAM OF AN ELECTRIC DRIVE



1. Electrical Motor

Electrical to Mechanical Energy Conversion

DC Machines

- Shunt, series, compound, separately excited DC motors.

AC Machines

- Induction, wound rotor, synchronous, PM synchronous and synchronous reluctance machines.

Special Machines

- Brush less DC motors, stepper motors, switched reluctance motors.

3. Controller

- Controller produces triggering pulses for Power Modulator
- Operates as per load requirements and sensor feedback
- Micro processor, PLC, Embedded System, etc..

4. Sensor

- Speed Sensor (From Motor) - Tachometer
- Rotor position sensing – Optical sensor
- Torque and Temperature Sensing – Electronic chip
- Current sensing and Voltage sensing

5. Electrical Sources and

6. Mechanical Load

Sources:

Very low power drives - single phase AC sources

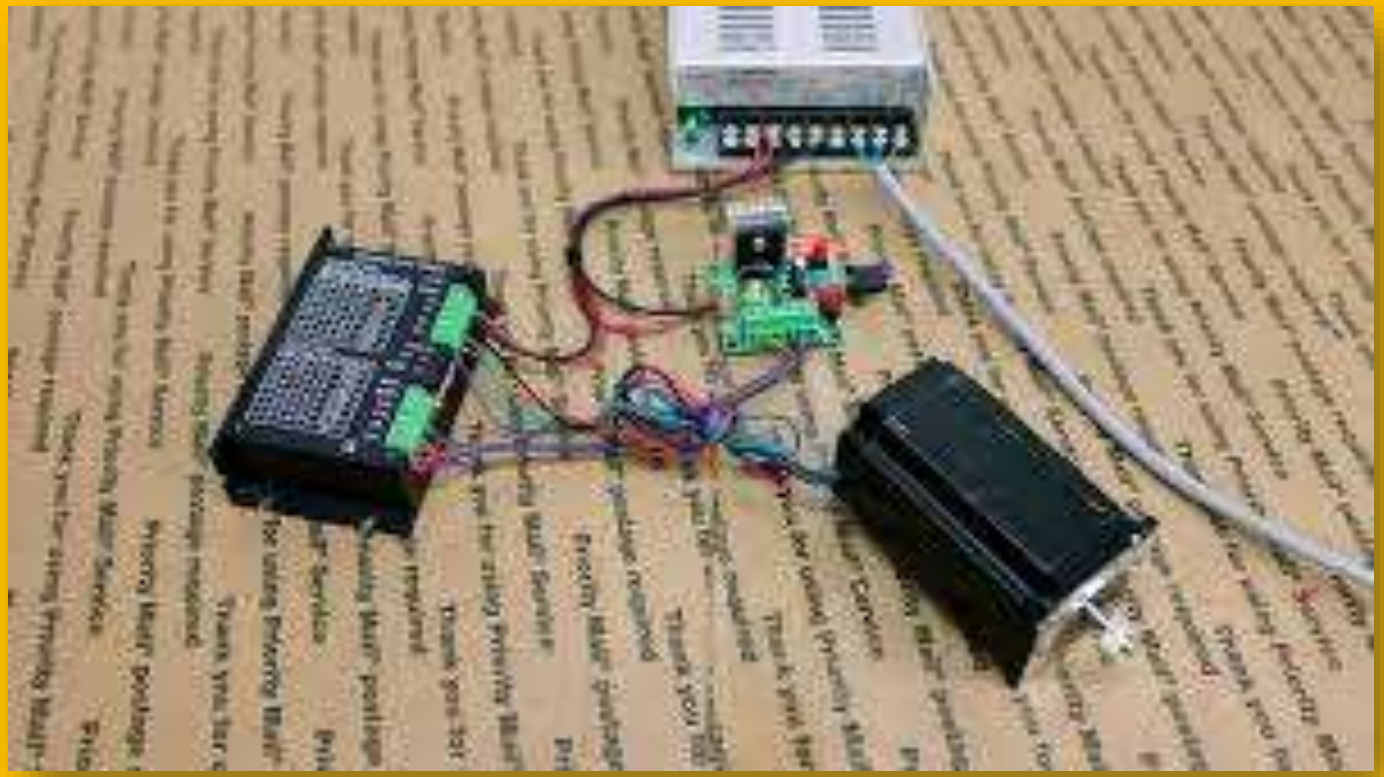
Low and medium power drives – three phase AC sources

High power drives – three phase AC 3.3 KV, 6.6 KV and 11 KV

Load: As per requirement

IDENTIFY THE PARTS :

Stepper Motor Drive



A CASE STUDY

Advantage of a drive

- Case study – Mitsubishi Electric:
- https://us.mitsubishielectric.com/fa/en/support/technical-support/knowledge-base/getdocument/?docid=3E26SJWH3ZZR-38-1241
- Mitsubishi VFD reduces energy bills while improving overall equipment effectiveness for pumping application for an aquarium.

ADVANTAGES OF ELECTRICAL DRIVE

1. **Automatic control systems**: PLC and computers

2. **Wide range** of torque, speed and power

3.Operating conditions such as **explosive and radioactive environments**

4. All the **four quadrants** of speed-torque plane

5. **Started instantly** and can immediately be fully loaded

6. Speed control, starting and braking is usually **simple and easy to operate.**

QUERIES / DISCUSSION

- Recall…

Thank you