EIPC (NEE-403)
Unit-4
Process Control

Elements of Control Systems

- Sensors: Pressure, Temp, Flow,
  Level, etc.
- Controller: P, PI, PID- Including
  comparator unit
- Actuators: Converts controller output to Mechanical Energy to regulate final control element.
- Final Control Element: Control Valves, etc.

Process Characteristics:

- Resistance Type Processes
- Capacitance Type Processes
- Transportation Time

What Does Control Engineering "Engineer"?

1. Process Design
2. Measurements
3. Final Control Elements
4. Control Structure
5. Control Calculations

Process Design

- A key factor in control engineering is the design of the process so that it can be controlled well. For this purpose systems should be responsive and few disturbances should occur.

- “A responsive control system” means the controlled variable responds quickly to adjustments in the manipulated variable.

- Frequency and magnitude of disturbances should be reduced.

Measurements

- The important decisions are
- selection
- location

of the sensors.

"one can control only what is measured"

The engineer should select sensors that measure important variables rapidly, reliably and with sufficient accuracy.

Final Control Elements

Final control elements provide the necessary changes in manipulated variables which are determined by control calculations. The selection of best final control element and selection of the location are important considerations.

Control Structure

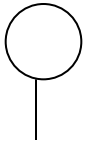
- The engineer must decide some very basic issues in designing a control system.
- This is similar to adjusting either the hot or cold water valve opening to control the temperature of water in a shower or making this directly on the heating source.

Control Calculations

After the variables and control structure have been selected the model equations are developed which use the measured and desired values in calculating the change in manipulated variable.

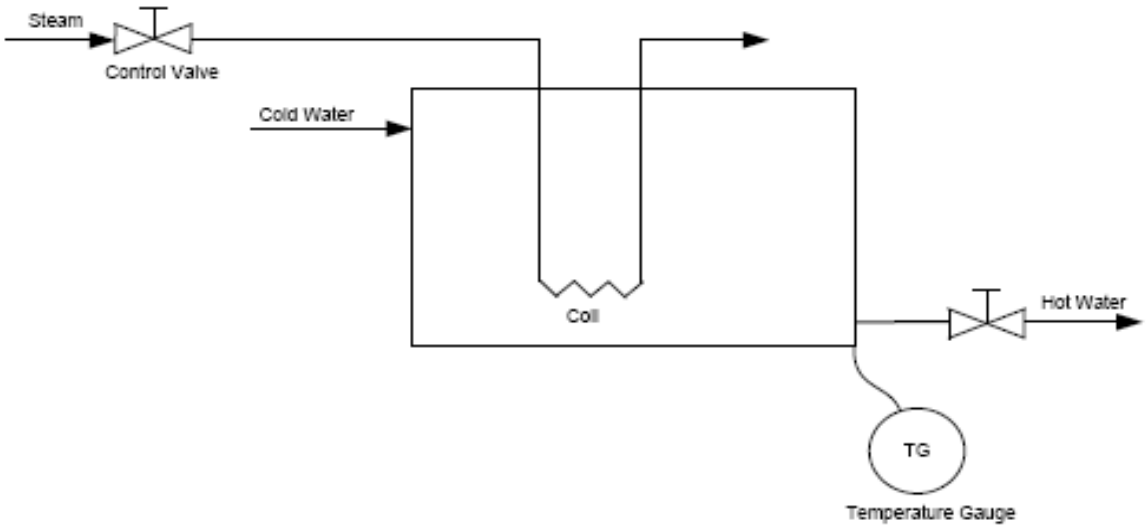
- In standard Drawing:
- all process equipment is drown in solid lines

- sensors are designated by a circle connected to the point in the process where they are located



- process control loops are shown by dashed lines.

Example showing Process Characteristics:
Heat Exchanger



Thank You