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**PROCESS CONTROL SYSTEMS**

Control systems provide a means of replacing human operators in many industrial processes. They are widely used to monitor and control pressure, temperature, motor speed, the flow of a liquid, or any other physical variable. They must be capable of fulfilling a number of functions. First, the physical variable must be controlled, such as the air temperature in a factory or the pressure of a hydraulic system, must be measured. Then its value must be compared with the desired value. Next, action has to be taken to reduce to zero the difference between the actual and the desired value.

The basic components of a control system are an input transducer, an error sensor, a controller and an output transducer. The input transducer converts changes in the physical variable into electrical signals. One type of transducers converts changes in pressure to frequency changes.

The error sensor measures the deviation between the actual and desired values for the physical variable. The controller receives the error sensor output and uses it to control the variable either directly or indirectly. A simple controller is an electromagnetic relay which uses a small signal to control a much larger signal such as a power supply output.

The output transducer converts the electrical output from the controller into whatever form of energy is required to change the physical variable. It may be a valve, a heater, a motor or any electrically operated piece of equipment. An example is a motor-operated valve which controls the flow of fluid in a pipeline.

Let us take as an example of a process system for controlling the speed of a dc motor. The input transducer measures the speed and converts it into a voltage. The error sensor compares this voltage with the voltage across a speed-setting potentiometer. The error sensor output is fed to the controller which sends a signal to the power supply of the motor. This increases or reduces the supply of current to the motor, thus controlling its speed.

The operation of a process control system is summarised in figure 1 which shows a closed-loop system. In such a system the results of the action of the controller are constantly fed back to it.

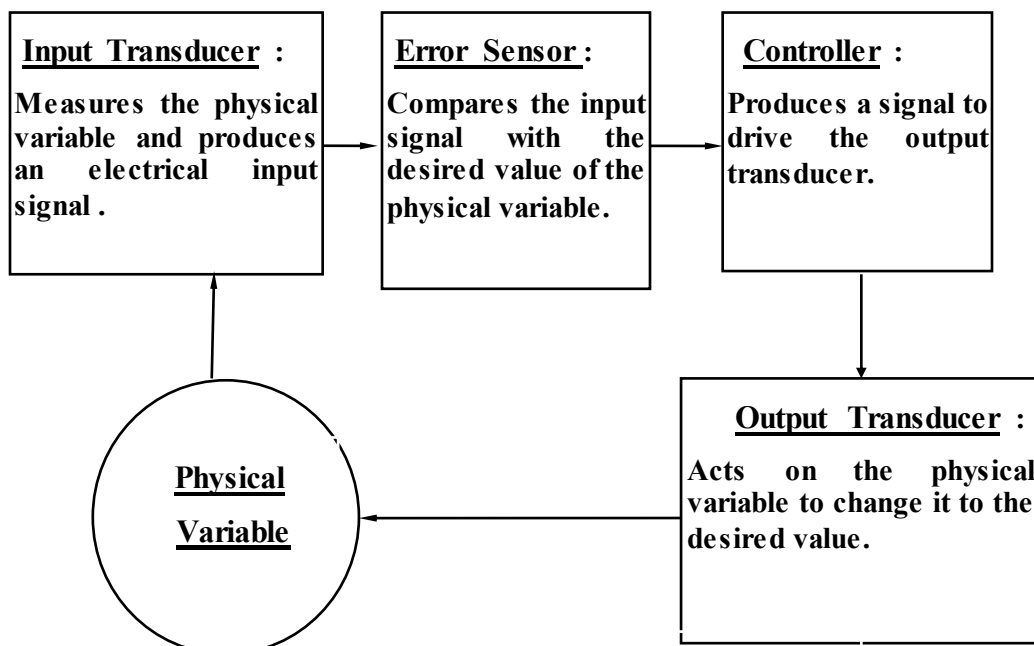


Figure 1 : A Process control System

1) **Meaning of some keywords :**

**to monitor : to check**

**the desired : the required**

**the deviation : the difference**

**to convert : to change**

2) **Questions :**

1\_ **What must a process control system be capable of doing ?**

2\_ **Compare an input transducer with an output transducer.**

3\_ **What is the function of an error transducer ?**

4\_ **What is a closed-loop system ?**

5\_ **How does a control system provide means of replacing human operators ?**