Process control engineering topics

- **Metrology**

  Sensors are used in the measurement of the variables. The variables involved may, for example, be pressure, flow rate, temperature and concentration in process engineering systems. In modern systems these variables must be converted into equivalent electrical signals for further processing.

- **Actuation systems**

  Actuators have direct influence on the process meaning that they can change the measured variable. Targeted manipulation of the flow rate in a pipeline by a control valve is an example of this.

- **Control engineering**

  The controller receives the measured variable (e.g. a flow rate) from the sensor as an input signal. In the controller this measured variable signal is compared against the reference variable signal pre-set by the operator. The controller sends an output signal corresponding to the control difference to the actuator. The signal processing in the controller follows a functional correlation between the input and output variables. A detailed knowledge of the process itself is necessary to allow for optimum setting of the functional correlation (e.g. via controller parameters P, I and D) within the controller.

- **Open-loop control**

  The signal processing sequences in process engineering systems are often repeated. Such sequence control can be implemented by programmable logic controllers (PLCs).

- **Process visualisation**

  Process visualisation ensures that the operator is integrated into the technical environment. A simplified visual representation of the process is essential to increasing operator understanding of complex processes and also provides him with the necessary information on the process state. From the control station, operators can use the visual information to make decisions and influence the process as appropriate.

- **Communication**

  The safe transfer of data from the process to the control station and from the control station to the process is a key aspect of process control engineering. Field bus systems are employed in the interconnection of multiple devices, such as controllers, PLCs and actuators, with the control station.