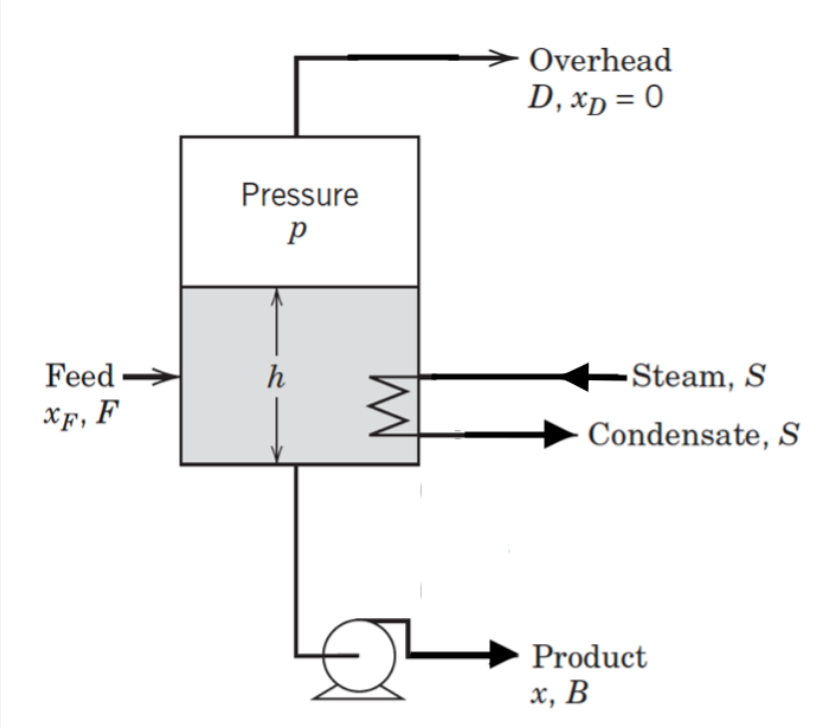
Section 4: CONTROL AND MONITORING

4.1. The feedback control

A feedback control is to be performed of a continuous evaporator (see the figure) that concentrates a product from the mass fraction x_F in the feed to the larger one x_B in the bottom stream.
The manipulated variable is the flow rate of saturated steam S.

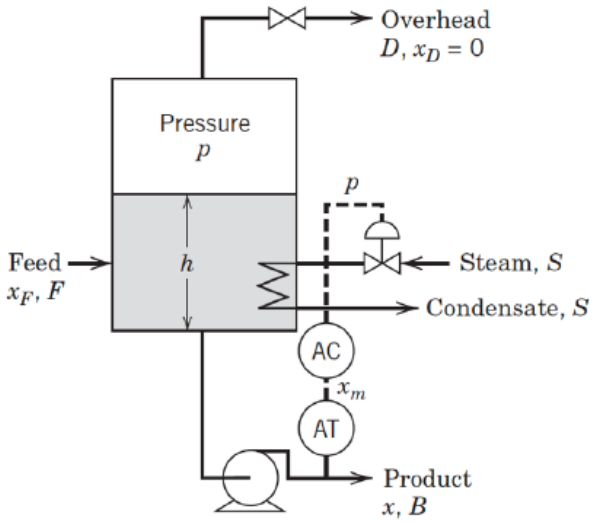


1. propose, on the same drawing, **the P&ID**
2. select the **controlled variable**
3. select the **disturbance variable** (if any)
4. draw the **block diagram for process control**

Among the various process **block components** (tank, valves, pump, etc.) individuate on the P&ID the characteristic variables of automatic control present in this process:

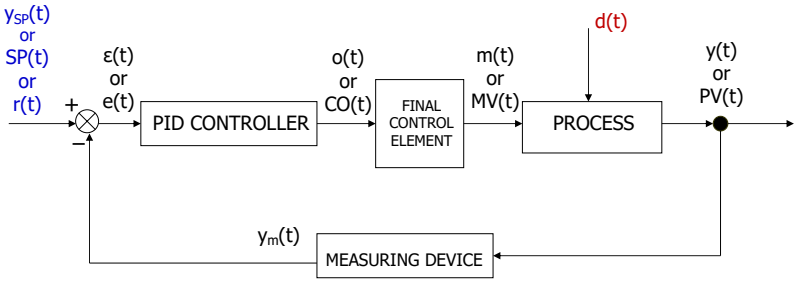
5. select the **sensor/measuring device**
6. select the **comparator**
7. select the **actuator**
8. select the **final control element**
9. what type of signal is used in the **control loop?**
10. what is the role of the tank in the **control loop system?**

1. A possible P&ID to feedback control the outlet composition is the following:



(Note that in this problem only the "manipulated variable" was assigned: flow rate of saturated steam S. Therefore, feedback control in which the measured and controlled variable is different than composition (i.e. level) would be equally right.)

2. Outlet stream composition;
3. Feed flow rate and composition;
4.



5. AT
6. AC
7. Valve actuator
8. Valve
9. Electrical
10. Process