Cascade Control

Considere el intercambio de calor mostrado en la figura 1. el vapor es usado para calentar el agua en el intercambiador de calor. Un controlador de temperatura se realimenta para comparar la temperatura del agua de salida con el set point y controle la tasa de flujo del vapor abriendo o cerrando el control de válvula.

Broadly speaking, there are two major functions of cascade control: (1) to eliminate the effect of some disturbances, and (2) to improve the dynamic performance of the control loop.

There are few other advantages of cascade control. They can be summarized as:

1. A strong (high gain) inner loop reduces the sensitivity and nonlinearity of the plant in the closed loop. The outer loop therefore experiences less parameter perturbations.

2. Cascading makes the use of feedforward control more systematic. In the heat exchanger example (Fig.2) it is possible to measure the water flow and add feedforward compensation to the flow controller. This would improve the speed of response to fluctuation in water flow, which is a disturbance (refer Lesson 15).

3. Cascade control often makes it possible to use simpler control action than what could be needed for a single controller. Though the number of tunable parameters is more in cascade control, a systematic tuning procedure (inner to outer) is available.

On the other hand the **major disadvantages** of cascade control are (i) more sensors and transmitters and (ii) more number of controllers.