

CHEMICAL ADDA

All chemical engineering notes

Monday, 22 February 2016

CLASSIFICATION OF VARIABLES IN CHEMICAL PROCESS CONTROL

Classification of variables in chemical process control

In controlling a process there exist two types of classes of variables.

Input Variable

This variable shows the effect of the surroundings on the process. It normally refers to those factors that influence the process.

- An example of this would be the flow rate of the steam through a heat exchanger that would change the amount of energy put into the process. There are effects of the surrounding that are controllable and some that are not.

There are two types of inputs.

Manipulated(or adjustable) inputs :

These are the variable in the surroundings can be control by an operator or the control system in place.

- The values of manipulated inputs can be adjusted freely by the human operator or a control mechanism.

Disturbances:

These are the input variable that can not be controlled by an operator or control system.

- There exist both measurable and immeasurable disturbances.
- The values disturbances are not the result of adjustment by an operator or a control system.

Output variable-

Output variable also known as the control variable.

These are the variables that are process outputs that effect the surroundings.

Measured output variables:-

The values of measured output variables are known by directly measuring them

Unmeasured output variables:-

The values of unmeasured output variables are not or cannot be measured directly

Example CSTR with cooling jacket

- Consider a continuous stirred tank reactor (CSTR) in which an irreversible exothermic reaction $A \rightarrow B$ takes place. The heat of reaction is removed by a

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- classification of chemical reaction
- CLASSIFICATION OF HEAT EXCHANGER BY CONSTRUCTION
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- Combination
- CSTR with cooling jacket
- Decomposition
- Diaphragm pumps
- distillation
- Disturbances
- Double-pipe heat exchangers

coolant medium that flows through a jacket around the reactor

where

- Input variables: C_{Ai} , T_i , F_i , T_{ci} , F_c
- Output variables: F_c , T_{c0} , C_A , T , F

Case 1:- If the inlet stream in the CSTR system comes from an upstream unit have no control.

- Disturbances: C_{Ai} , F_i , T_i

Case 2:- If the coolant flow rate is controlled by a control valve, then

- Manipulated variable: F_c
- Disturbance: T_{ci}

Case 3:- If the flow rate of the effluent stream is controlled by a valve

- Manipulated variable: F

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Labels: CSTR with cooling jacket, Disturbances, Input Variable of control process, Manipulated(or adjustable) of control process, Output variable of control process

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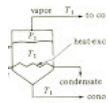
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COMPARISON OF SINGLE AND MULTIPLE EFFECT EVAPORATOR

Comparison of single and multiple effect evaporator Single-effect evaporators Single-effect evaporators are used when the thro...

$$\frac{t_y * \text{specific gr}}{3960 * \text{efficiency}}$$
$$\frac{t_p * \text{specific gr}}{3960}$$

POWER AND EFFICIENCY OF CENTRIFUGAL PUMP

Power and efficiency of centrifugal pump Brake Horse Power (BHP) and Water horsepower (WHP) The work performed by a pump is a function of...

ifference betwe
Unit operation
and
Unit process

DIFFERENCE BETWEEN UNIT OPERATION AND UNIT PROCESS

Difference between Unit operation and Unit process The chemical process is a combination of unit processes and Unit operation. Hence ...

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