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Pre-Task 3

Open-loop Control:

Open-loop control is a loop that is not effect by the output of the system. For example, a heater boiler system that uses a timer instead of a temperature gauge. The heater doesn't worry about the temperature at in the room or the amount of heat that is being out put. It uses a timer which doesn't take the heat or the state of the boiler into consideration for a comparison to stop or continuing it's functions. The main characteristics of an open-loop system as first there is no comparison between actual and desired values. An open-loop system has no self-regulation or control over the output value. Each input setting determines as fixed operating positions for the controller. Changes or disturbances in external conditions does not result in a direct output change (unless the controller setting is altered manually).

Open-loop Control system can be represented by a cascading block system. You have an input reference. Then it goes through a loop that gives no feedback about the situation until it finishes. Then it gives the output.

Closed-loop Control:

A closed loop system is a loop that is dependent on the process output. For example, an oven heats up to the desired temperature and then turns off until it cools down a little bit then turns back on again to heat up in a continuous loop. This a closed loop, because the point of an oven is to output heat and the loop that it uses is based on that temperature. The point of a closed-loop control is to reduce errors by automatically adjusting the systems input. This means that it can improve stability of an unstable system. Or even increase robustness against external disturbances to the process. This allows the creator or user to increase or reduce the systems sensitivity. This all helps to produce a reliable and repeatable performance.

A closed-loop has to be able to tell the difference between undesired output and a desired input to be able to give itself feedback. This is what makes it a close-loop control.

PID Controller:

PID stands for Proportional Integral Derivative controller. It is a loop feedback mechanism controller. It usually is used to continuously calculates an error value as the difference between a desired set-point and and the value that was processed. P accounts for present values of the error. For example, if the error is large and positive, the control output will also be large and positive. I accounts for the past values of the error, For example, if the current output is not sufficiently strong, the integral of the error will accumulate over time, and the controller will respond by applying a stronger action. D accounts for possible future trends of the error, based on its current rate of change.

Reference:

http://www.electronics-tutorials.ws/systems/closed-loop-system.html
http://www.electronics-tutorials.ws/systems/open-loop-system.html
https://en.wikipedia.org/wiki/Open-loop_controller
https://en.wikipedia.org/wiki/PID_controller