

What is Process Control? and Why You Should Care - First prelude to Issue 7

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BACKGROUND

The final results of the poll on PID tuning are depicted in Figure 1.

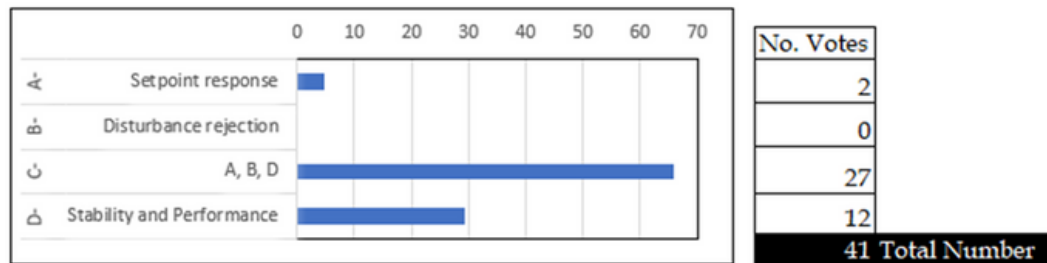


Figure 1 - PID Controllers should be tuned for?

COMMENTS ON THE OPTIONS

A-Users frequently request setpoint response in process control, but it is rarely needed..

B-Disturbance rejection is the most important criteria, regardless of the tuning method of choice.

C-A, B and D: Certainly, the best choice amongst the given options.

D-Stability and Performance: Must be part of the tuning process.

HOWEVER, THE WORLD IS MORE COMPLEX

- The two-degree-of-freedom PID controller is capable of achieving both excellent setpoint tracking and load rejection..
- Assuming that you have a high-fidelity model of the process, which you never will, Stability, or the more generic term, Robustness, and Performance are inversely related; You cannot have good performance and good stability at the same time.

THE WORLD IS, HOWEVER, MORE COMPLEX (CONT.)

- Acknowledging that there are many others, here are the definitions I use:
 - Robustness is the smallest change in any process parameter that will cause a continuous oscillation in the loop.
 - To evaluate the performance of a controller the error (the difference between setpoint and controlled variable) must be considered. The Integrated Error (IE) is useful for minimizing errors but does not provide information about stability. The Integrated Absolute Error (IAE) is a better metric for assessing stability.
- Precision and accuracy are critical for process engineering to ensure material and energy balances are closed. In process control, however, the most important trait in any variable measurement is repeatability.

THE WAY I SEE IT

Loop tuning can be a complex task. It depends on the specific process requirements and is not as straightforward as it seems. Control loops are rarely stand-alone entities. Rather they are part of larger systems.