

Open or Closed Loop?

Mechanical Engineering

What feedback buys you, and the stability it costs in exchange.

Open loop

- The output is never measured
- Cheap, simple, always stable
- Cannot reject a disturbance
- Accuracy depends on calibration

Closed loop

- Output is measured and fed back
- Rejects disturbances and drift
- Too much gain makes it unstable
- Needs a sensor, and sensor noise enters

THE DIFFERENCE THAT MATTERS

Feedback buys accuracy and disturbance rejection, and it costs you stability margin.

A toaster is open loop; an oven with a thermostat is closed. Both are correct choices for their job.