

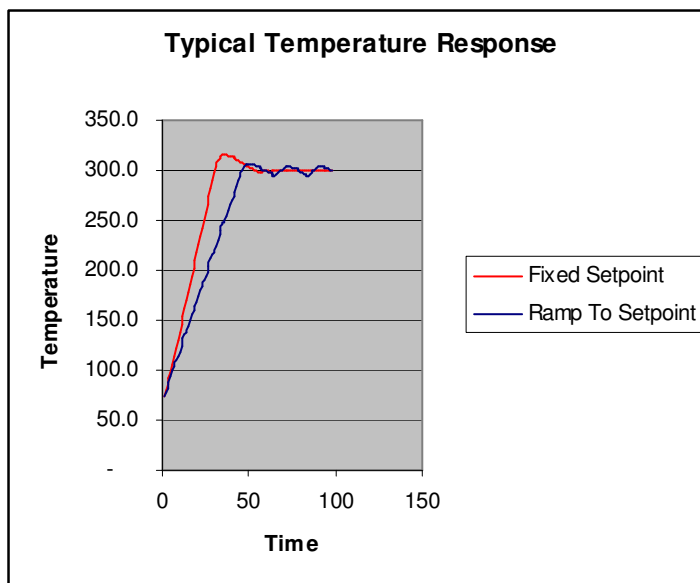


## Applications Note 509 Reducing Overshoot with “Ramp To Setpoint”

**Q: What are some techniques I can use to reduce overshoot at start-up in temperature control systems?**

**Answer:** Last month we talked about some common techniques for reducing overshoot in temperature control systems. ([www.AdvIndSys.com/ApNotes/ApNote508-ReducingOvershootAtStart-up.pdf](http://www.AdvIndSys.com/ApNotes/ApNote508-ReducingOvershootAtStart-up.pdf)) While not part of the standard PID control algorithm another very powerful tool is “Ramp To Setpoint”. “Ramp To Setpoint” ramps the controller’s setpoint at a specified rate to keep the process under control during start-up.

Ramp to setpoint is specified in degrees per hour. Think of it as a controlled heating process, that instead of letting the burner glow red hot, keeps it just below the point where the process takes off and runs out of control during the start-up phase.



In a “Ramp To Setpoint” approach, the target temperature (setpoint) is kept near the actual process temperature. Note that the error is thus only a few degrees above the actual process temperature, keeping the process under control at all times. With a “Fixed Setpoint”, the “I” (Integral) value in the PID equation has the opportunity to build up large errors (called wind-up) which must be “worked off” at setpoint, increasing overshoot.

Ramp to Setpoint may also eliminate the necessity for manual start-up. Manual start-up is often used where the process races out of control, only to overshoot badly at setpoint. Note that by keeping the errors within limits, the accumulated error at setpoint is almost zero, allowing the Integral to do its job and trim the process temperature exactly into temperature at setpoint.

Not all controllers have “Ramp To Setpoint”. If your application requires tight start-up control, you may want to look for a temperature controller that has this feature. All of the new series of CAL controllers have this feature. Check with your controller vendor to see if their controllers support “Ramp To Setpoint”.

For a complete list of Applications Notes, Conversion Factors, Applications Data and Sample Configurations see [www.AdvIndSys.com/ApplicationsNotes.htm](http://www.AdvIndSys.com/ApplicationsNotes.htm)