

CUSTOMER CHALLENGE: Automating Control and Reducing the Cost of Manual Intervention

Wild is a Good Thing...At the Zoo!

Modeling the Dynamics of Highly Oscillatory Processes:

The best time to visit the local zoo is early in the morning around feeding time. That's when the animals are out and about, and it's when they showcase their wild side. Although fun to experience while on vacation, this type of wild behavior is anything but acceptable in a manufacturing facility. Wild is unstable and unsafe. It's unprofitable.

When a leading producer of syrup and sweeteners encountered persistent and wild behavior in a key production process, the company fully understood what was at stake. The dynamics required regular intervention by engineering staff and accelerated wear and tear on costly instrumentation. The financial impact wasn't limited to the process as frequent shut-downs hindered the plant's overall output.

Although previous attempts to reign in the process' wild behavior had failed, bottom-line profitability was being affected negatively and a solution was needed. The manufacturer turned to Control Station and to LOOP-PRO for help with taming process volatility.

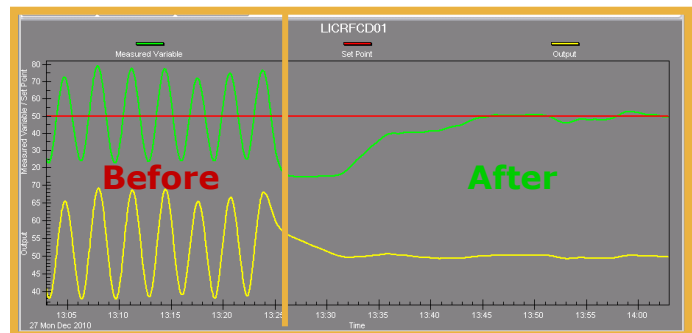
BEFORE: The process fluctuated $\pm 30\%$ around Set Point and uncomfortably close to its Hi-Hi and Lo-Lo constraints.

AFTER: The process' wild dynamics were reigned in and control was finally automated with operation $\pm 4\%$ around Set Point.

When a Picture Tells a Thousand Words

Regular product changes kept the plant's Filter Aid Process in start-up mode, and each change-over required a unique set of tuning parameters to control the process' liquid level. The dynamics of the drum's liquid level were exceptionally fast whereby even 2 seconds of excess draining or filling resulted in the process being shut down. The wild swings of $\pm 30\%$ that were experienced during start-up required regular manual intervention and resulted in excessive wear and tear on process instrumentation. In the view of engineering staff the process operated uncomfortably close to its High-High and Low-Low constraints and a solution was needed.

Tuning parameters for each product were initially copied from another process with similar characteristics. With those values used as a baseline, engineering staff then manually adjusted the parameters in the hope of achieving a reasonable level of control. Given the ad hoc nature of this approach and the volatile dynamics of the Filter Aid Process, this was less than ideal. Unfortunately, when PID tuning software had been used in the past, the programs consistently failed to provide meaningful control due to their inability to model oscillatory data.



Needing a solution to this recurring and costly control issue, the engineers turned to Control Station and LOOP-PRO. The LOOP-PRO software utilizes a patent-pending innovation that permits the accurate modeling of oscillatory, transitional and noisy process data. The graphic above shows the uncontrolled dynamics of the Filter Aid Process on the left – the "Before" data. Using LOOP-PRO the plant's engineers were able to quickly model the dynamics even though the associated data never settled to a steady-state. The resulting tuning parameters were spot on and immediately made an impact on control over the drum's liquid level. Shown on the right is the performance using LOOP-PRO's tuning values. It reduced oscillations to $\pm 4\%$ around Set Point and permitted plant engineers to operate the process in automatic mode. Now that's a meaningful process improvement!