

Control Performance Improvement

- Reduce process variability and improve product quality
- Improve process availability with less operator intervention and better regulatory compliance
- Maximize the benefits of advanced control



Emerson provides consulting, tools, and training to optimize the performance of individual control loops and to coordinate the response of all loops in a process unit.

Introduction

Emerson Process Management is pleased to offer process optimization expertise through the combined resources of our Control Performance group and our Local Business Partners. Our consultants will perform onsite troubleshooting, startup assistance, controller tuning, process simulation, implementation of advanced control solutions, and training of plant staff. They have wide experience in the process industries including Refining, Chemical, Power, Pipelines, Pharmaceutical, Food & Beverage, Mining & Metals, Pulp & Paper and others.

Benefits

Reduce process variability and improve product quality.

Our Control Performance Improvement consultants can quickly determine the root cause of and solution for loop performance problems such as cycling and slow response. They can tune all loops in a unit for a coordinated response to load disturbances

and set point changes. The resulting reduction in process variability will help to minimize consumption of raw materials and energy while yielding product quality improvements.

Improve process availability with less operator intervention and better regulatory compliance.

Our expert consultants can help you determine the causes of and solutions for process upsets, trips, and operator intervention on key control loops. We can help to reduce unplanned events, thus lowering maintenance costs for your process equipment.

Maximize the benefits of advanced control. Unless base-level control loops can reject disturbances and respond correctly to set point changes, an advanced control system cannot perform correctly.

Control Performance Improvement consultants can quickly diagnose limitations of base-level loops, and can identify the control loops that will provide additional profit from advanced control.

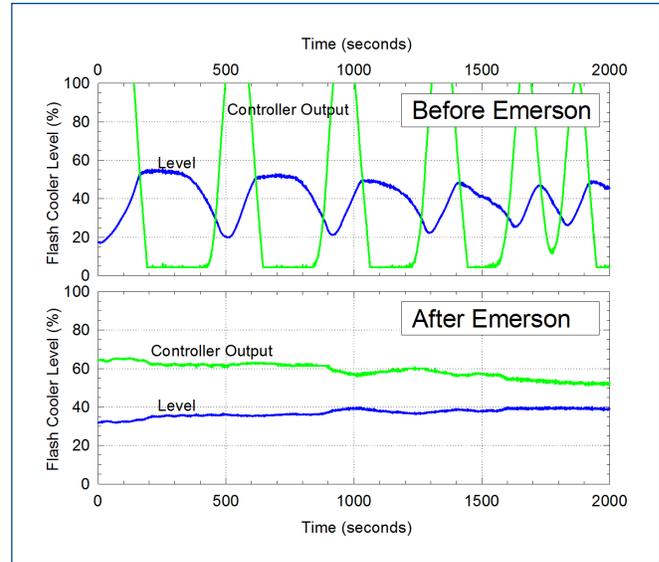
Service Levels

- **Consult For A Day** brings a consultant to inspect your process, gather data manually, and identify critical opportunities for improvement. This service is typically provided at a fixed price.
- **Control Performance Study** involves a consultant working with your plant to test the process online, identify process dynamics and nonlinearities, optimize controller tuning, and recommend improvements to control strategy and process design. It typically covers one week or less and is provided on a per diem basis.
- **Control Performance Project** involves multiple weeks of work, all the tasks of the Study in greater detail, calculation of your return on investment, and onsite measurements or computer simulation. This service typically is provided on a per diem basis.
- **Control Performance Program** is a sustained effort for ongoing variability reduction. Periodic visits by the consultant allow the plant time to address deficiencies in hardware and control strategy before final tuning. This program often involves training of plant personnel so that they can sustain the increased profitability.
- **EnTech™ Variability Index (EVI) helps pulp and paper mills benchmark their machine performance.** The EVI covers frequency bands that point to upstream areas for diagnosis and improvement. The EVI typically involves one to two days onsite and is provided at a fixed price.

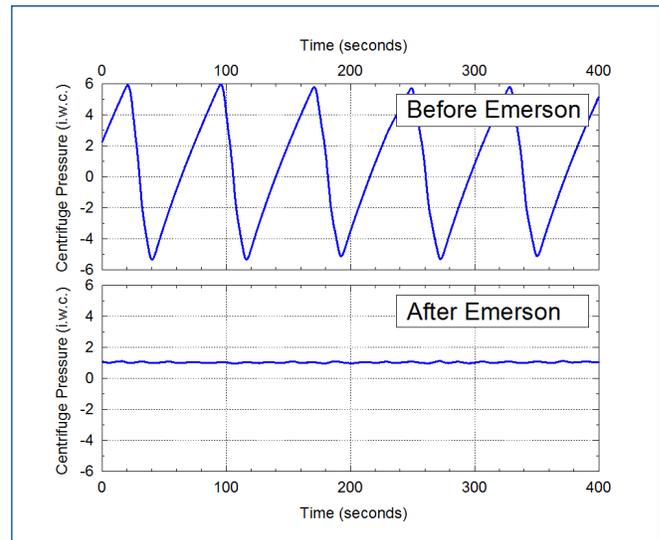
Some typical examples of Control Performance Improvement:

A carbon dioxide plant unit experienced six shutdowns per month and product quality did not meet specifications. Cycling in the output to the ammonia valve severely disturbed the refrigeration system.

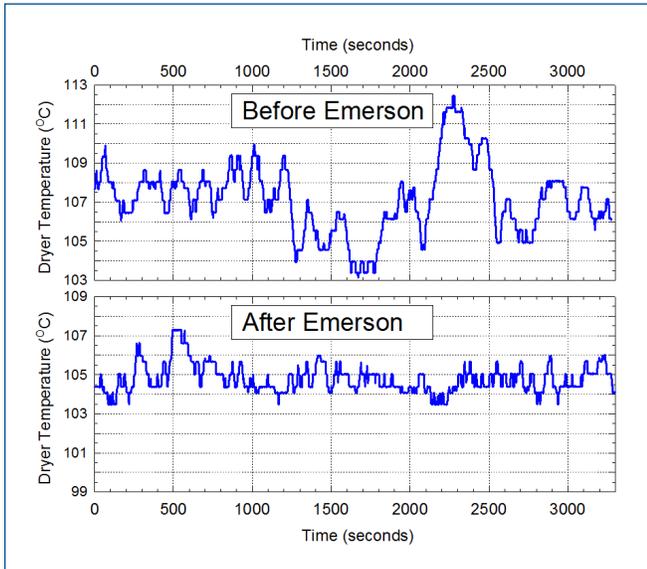
Investigation by Emerson using the EnTech Toolkit uncovered problems with the instrumentation, controller tuning, and maintenance practices. Corrections were made and shutdowns due to the cycling were eliminated (see the diagram above).



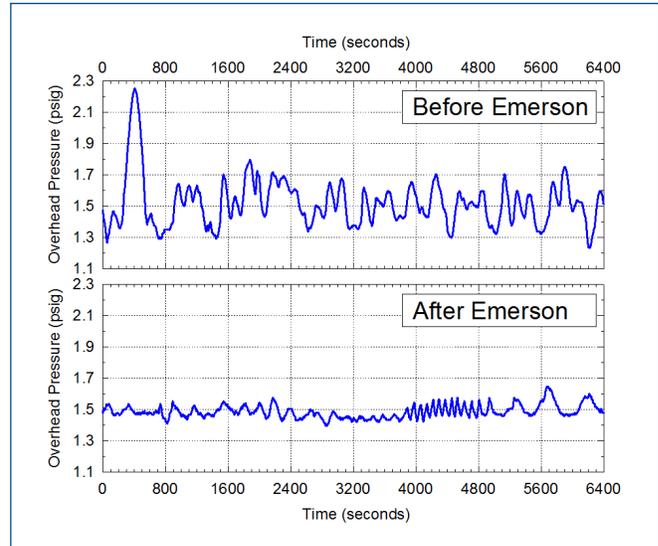
- A pharmaceutical plant could not hold pressure constant on a new centrifuge, preventing them from filling the reagents and washing agents correctly. Onsite investigation by Emerson using the EnTech Toolkit uncovered an inappropriate controller algorithm. Emerson assisted the plant systems engineer to reprogram the algorithm and apply Lambda tuning. Pressure oscillation was minimized allowing product from the centrifuge to meet FDA standards (see the diagram below).



- An aluminum hydrates plant needed to increase production in their spray drying operations but found that adjusting the tuning did not help. The Emerson consultant determined that improvements were needed in the control strategy. Improved pairing of the manipulated and controlled variables, plus Lambda tuning, allowed for a more robust loop response and reduced resonance. Temperature variations were reduced by 57% (diagram below) allowing the plant to increase annual production by 12%.



- Operation of the distillation column in a PTA plant was unreliable resulting in loss of product and frequent operator intervention. The control loops had been tuned by “feel”. Emerson applied Lambda tuning systematically to separate the dynamics of the overhead pressure, condenser outlet temperature, and feed pressure. Variability was greatly reduced (diagram below). The savings in acetic acid alone paid for the project in less than two years.



Emerson Tools Applied to Your Plant

Onsite Investigations - Diagnostic data can be gathered from any control system, either as analog signals or digital data from plant servers. Tests can reveal nonlinearities in control loops. Results are analyzed to determine optimum controller tuning. Lambda tuning enables coordination of the actions of related loops such as cascade control strategies.

Process Simulations - When a process is difficult or dangerous to test, a first-principles computer simulation can be built. As an example, a power company was unable to start the power augmentation systems at 20 new plants. The system was unstable, resulting in a plant trip when power augmentation was brought online. Emerson built a simulation to show that the piping design and pressure controller design limited the ability of the steam flow controller. After changes to the control strategy and minor piping changes, Emerson assisted onsite with controller tuning, enabling the system to start up.

Training - Plant staff can learn our proven techniques for testing and optimizing control loops. See the listing of courses at: www.emersonprocess.com/solutions/services/entech/seminars/

EnTech Toolkit - Emphasizes non-oscillatory Lambda Tuning with the speed of response (Lambda) selected by the user. The Toolkit complements the abilities of DeltaV™ Tune by addressing more complex types of processes.

EnTech Variability Index (EVI). For the pulp and paper industry, a benchmark that compares the variability on a machine to other machines. The EVI covers frequency bands that point to specific areas for diagnosis and improvement.

Advanced control tools such as DeltaV Insight and PredictPro - When optimizing the performance of control loops, Emerson consultants will recognize applications for model predictive control and automated monitoring systems. Consultants can also implement and tune the advanced control system.

Ordering Information

Description	Model Number
Control Performance Improvement Service	VE9134

This service requires a written project scope of work, deliverables, timing and budget. The service request must be reviewed by the service performing organization and a written proposal issued by the Local Emerson Organization prior to order acceptance. In some cases, a Site Security Assessment evaluation may be required to develop the project plan and the associated pricing.

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