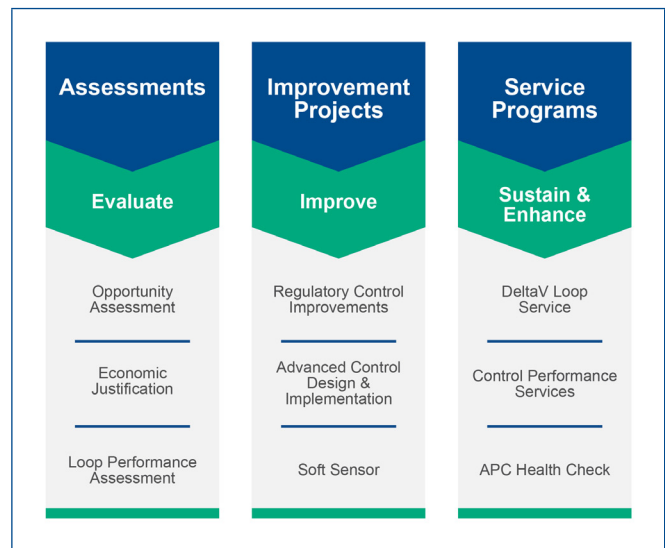# Control Performance Improvement Projects

- Apply corrective actions from a Control Performance Assessment

- Implement Advanced Process Control (APC) schemes

- Reduce process variability and improve operational performance

Assessments	Improvement Projects	Service Programs
Evaluate	Improve	Sustain & Enhance
Opportunity Assessment	Regulatory Control Improvements	DeltaV Loop Service
Economic Justification	Advanced Control Design & Implementation	Control Performance Services
Loop Performance Assessment	Soft Sensor	APC Health Check

Assess, improve, sustain, and enhance your process control strategies with Emerson's portfolio of Control Performance Solutions

Introduction

Emerson's Control Performance Improvement Projects can either be delivered to implement follow-up recommendations identified during a Control Performance Assessment or help implement a pre-defined scope of Advanced Process Control (APC) applications. Emerson's Control Performance Consultants provide turn-key services to design, configure, install and commission a wide variety of APC applications. Emerson has proven experience implementing embedded technologies such as DeltaV™ Predict and PredictPro, DeltaV Neural, as well as solutions from our alliance partner, AspenTech, such as Aspen DMC3™, Aspen Inferential Qualities™, or Aspen GDOT™.

Benefits

- **Apply corrective actions from a Control Performance Assessment** – At the completion of a Control Performance Assessment, a problem has been sufficiently analyzed and a path forward is typically proposed. What results is a detailed project plan that serves as a roadmap to achieve the identified benefits. Throughout the project, an Emerson Consultant will ensure the changes being made will result in tangible benefits that are aligned with your business and operational goals.

- **Implement Advanced Process Control schemes** – Emerson has the expertise to deliver high-quality Control Performance solutions for plant operations with very complex process dynamics. Example projects include, but are not limited to, modifying existing control strategies to include more advanced regulatory schemes such as Feed Forward Control, implementing Model Predictive Control (MPC) strategies, and training Neural Network models.

- **Reduce process variability and improve operational performance** – Once the root cause of loop performance issues is determined, Emerson Consultants can help you remediate these problems. Emerson's Control Performance Improvement Projects are designed to reduce process variability which can impact quality, throughput, or raw material and energy consumption. After reducing variability, an Emerson Consultant will help you shift your set points to achieve optimum process performance.

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Service Description

Regulatory Control Improvements

The results of a Control Performance Assessment may identify improvements that can be made to your Regulatory Control strategy. Emerson has experience leveraging the advanced features of PID and the associated Function Blocks to improve control loop performance.

This service is a natural progression from an Assessment where tuning and other quick fixes have already been addressed. Control strategy enhancements that require additional time for configuration, testing, and tuning will be applied. Examples of Advanced Regulatory Control Strategies include:

- Cascade Control
- Feedforward Control
- Feedforward Ratio Control
- Decoupler Control
- Split Range Control
- Mid Range Control
- Deadband Control
- Override Control
- Deadtime Compensator – Smith Predictor
- Linearization of Control Valves
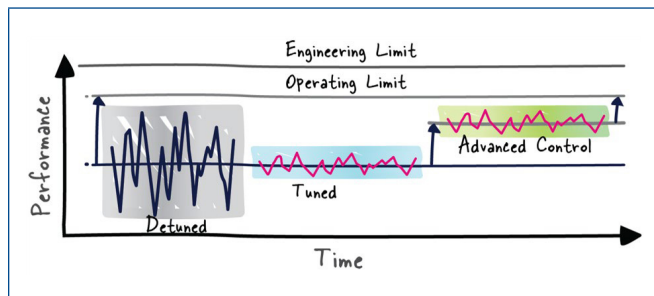
Advanced Control Design & Implementation

Advanced Process Control (APC) identifies variables that are key to process performance (and profitability) and drives them to their desired values. Model Predictive Control (MPC), a subset of Advanced Control, uses process models and costs to optimize profitability within a given set of constraints. MPC is excellent at maximizing profitability by optimizing product quality and predicting behavior of interacting loops. A typical APC project would include the following steps:

- **Regulatory Control Performance review** – ensure that regulatory control loops are performing well enough to support an APC strategy.

- **Pre-step tests and plant test design** – obtain initial process dynamics.

- **Functional Design Specification (FDS) Development** – define the Controlled Variables, Manipulated Variables, and Disturbance Variables in a Model Predictive Controller.

- **Configuration** – control system configuration work.

- **Step testing and data collection** – final step testing to determine process models and relationships for all variables.

- **Model identification and controller building** – analyze the models and building controllers based on these models.

- **Controller simulation and testing**

- **Commissioning** – download models and tuning the controller.

- **Site Acceptance Test (SAT)** – full control strategy test to obtain Customer acceptance.

- **Project Post Audit** – approximately 3-6 months after SAT, return to confirm controller stability and verify benefits.

A project involving onsite time for process step tests and commissioning can vary from one to four weeks per controller, depending on process complexity, process response time, and the ability to simultaneously step test manipulated variables independently.

Soft Sensors

Implementation of an Inferential Measurement (Soft Sensor) is often included in an APC project since many of the key variables being optimized rely on infrequent or unreliable measurements from analyzers or lab tests.

Various technologies and methods can be used to implement a soft sensor, including DeltaV Neural, Aspen Inferential Qualities, and manual regression and model fitting methods. Emerson is experienced with each of these methods and can help you determine the appropriate solution depending on your specific situation and requirements.

Ordering Information

Consult your local Emerson office or Emerson's Control and Operator Performance Center of Excellence for availability and quotation.

Related Products and Services

- Control Performance Assessments

- Control Performance Service Programs

- DeltaV Predict and PredictPro

- DeltaV Neural

- Aspen DMC3

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