

Control Performance Solutions: Service Programs

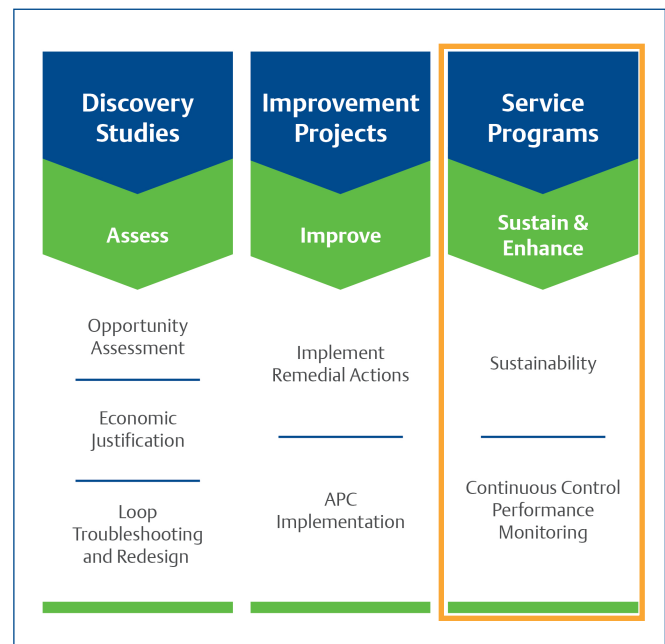
- Reduce process variability and improve operational performance
- Maximize the utilization of control loop diagnostic tools
- Sustain your operational performance through continuous process monitoring
- Maintain the benefits of an Advanced Process Control (APC) scheme



Control Performance Service Programs will allow you to sustain the performance of your control strategies over the entire lifecycle of your plant.

Introduction

Emerson offers process optimization expertise through the combined resources of Control Performance consultants and Emerson's Local Business Partners. Emerson's service programs provide periodic reviews of your control performance, including assessing the health and effectiveness of the associated instrumentation and control valves. These programs require periodic review of actual process data, either with consultants onsite or through remotely connected services. We can also provide hands-on training and mentoring of your employees, ensuring that they are effectively utilizing software tools that can monitor the health status of your key automation assets. Additionally, Emerson consultants can help you improve your control strategies, from simple PID loops to large and complex Advanced Process Control (APC) strategies. The performance of your control strategies may degrade over time, and frequent attention must be given to ensure that they keep yielding the operational benefits they were designed to achieve.



Emerson's portfolio of services in Control Performance Solutions will help you to assess, improve, sustain, and enhance your process control strategies.

Benefits

Reduce process variability and improve operational

performance: Process variability can have negative impacts on your plant efficiency, throughput, product quality, or raw material and energy consumption. Our Control Performance Improvement Consultants can determine the root cause of loop performance issues, ensuring that unwanted variability is not allowed to creep into your process. Assessments of your most critical control loops should occur frequently or even continuously to find issues and correct them as early as possible.

Maximize the utilization of control loop diagnostic tools:

Emerson has beneficial tools to help your staff maintain and improve upon the performance of the fundamental automation assets within the control loops in your facility. The information in these tools is valuable, but the tools are often not fully utilized due to resource limitations in your facility. You can enlist Emerson to “turn on” these tools for you and provide hands-on training of your employees to properly set up the software, monitor your key loops, and generate and interpret reports.

Sustain your operational performance through continuous

process monitoring: In a typical process plant, almost two-thirds of control loops are underperforming, whether running in manual or exhibiting excessive variability. Many plants do not have a formal, consistent approach to troubleshooting the root cause of poor control leaving most problems uncorrected. Without routine and regular monitoring, problems may go undetected for weeks or even months before someone notices a problem. Through continuous monitoring, you can allow Emerson to help you understand when a faulty measurement, defective valve, or poor tuning is getting in the way of achieving your operational goals.

Maintain the benefits of an Advanced Process Control (APC)

strategy: APC projects often have a quick payback period; however, to sustain those benefits over a long period requires regular oversight by a qualified expert. After implementing a new control strategy, Emerson recommends periodic reviews to make sure the strategy is performing as best as possible. If left unmaintained, operators may turn off the APC and return to operating as before. You can trust Emerson to ensure that your initial investment in APC is preserved and allow your plant to reap the benefits of APC for years to come.



Service Description

Emerson offers several service programs that can help you maintain, sustain, and enhance your control performance. For each of these programs, we use a team of expert consultants that have experience in many process industries including Refining, Chemical, Power, Pipelines, Pharmaceutical, Food & Beverage, Mining & Metals, Pulp & Paper and others. Our Control Performance Programs Include:

- Startup Services
- Continuous Performance Monitoring Services
- APC Support & Maintenance
- Training & Mentoring Services
- Resident Consultant
- Connected Services

Our programs can be tailored to fit your specific needs and requirements.

Startup Services

Whether starting up a completely new greenfield process, an existing process after a major turnaround, or an existing process after a brownfield control system migration, your control loops may exhibit oscillatory behavior as you ramp your production towards steady-state. In the case of a greenfield startup, tuning of loops as they come online can help your operators put them in Automatic Mode sooner, allowing for a safer, quicker, and more profitable startup. In the case of a brownfield startup, modifications made during a turnaround may create different operating conditions that affect your process dynamics; what may have been tuned optimally before turnaround may be difficult to control post-turnaround.

Startups can be a stressful experience, and Emerson consultants can help you stabilize the controls, tune loops as necessary, and troubleshoot any unforeseen control problems that arise. We can supplement your internal operations team, allowing them to focus on critical mechanical tasks while we focus on control performance and process stability tasks.

Continuous Performance Monitoring Services

Engineers should be equipped with the latest software tools that can provide a systematic way to monitor, diagnose, and improve process control performance. Such software needs to be deployed properly to maximize your return on investment.

Emerson can help you deploy DeltaV™ InSight effectively by utilizing best practices from trained experts who know the full capabilities of the software. This service includes setting up the software such that all parameters, performance indices limits, loop priorities, and suggested options are properly configured for each control loop in your DeltaV System. The consultant will work with your process and operations staff such that the resulting performance dashboards and reports maintain the appropriate focus on your most critical control assets.

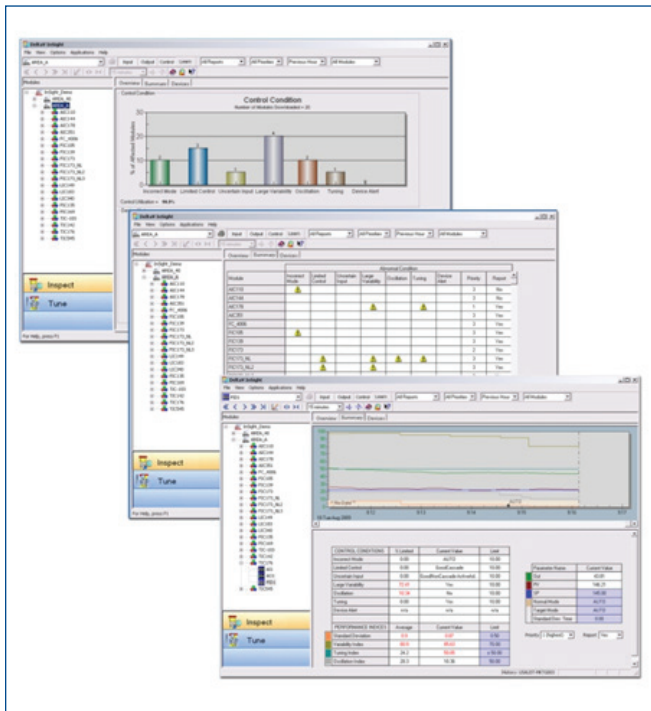
Depending on the size of your DeltaV System(s), this service can take between 1-5 days, or the service can take even longer for very large and/or multiple systems. This service includes training presentations and actual configuration of your DeltaV InSight software, and can be tailored to include additional off-site support and consultation if requested. The consultant will involve your key stakeholders, which includes hands-on training so the DeltaV InSight software is properly maintained into the future and appropriately applied to new or changed control loops. After the consultant leaves site, we can include a bank of hours to be used for remote support or consultation if necessary.

APC Support & Maintenance

If APC solutions are not maintained properly, the advanced controls are eventually turned off and the operators go back to the “old way” of operating, thus losing the benefits from the technology investment. There are a number of reasons why APC performance degrades over time, such as poorly performing regulatory controls, control valves sticking, and process changes or constraints that are not reflected in the original APC models. Many of these can be relatively easily resolved with the appropriate resources and attention.

Whether you have an Emerson SmartProcess™ Application or a customized APC strategy, Emerson can provide ongoing support to guarantee that you will be receiving all the benefits from your APC investment. This support provides access to experts to help troubleshoot APC performance issues, as well as access to new releases, upgrades, and documentation. On a scheduled and routine basis, Emerson can send a consultant to your site to provide an APC health checkup which will include the following:

- Analyze the overall performance of your APC strategy or SmartProcess Application
- Confirm the optimizer is working as designed
- Review the performance of regulatory control loops
- Make tuning adjustments to process models and regulatory control loops (if necessary)
- Provide a report documenting the findings and recommendations for further improvement



Training & Mentoring Services

Emerson consultants bring relevant industry expertise to train and mentor your Process Control Engineers. Training courses can be tailored to fit your specific needs, and can include both classroom-style lectures and hands-on training using your actual process data on your live DeltaV System. Topics can be combined, if necessary, to create a curriculum that covers many topics relevant to achieving better Control Performance. Some topics include:

- Use of DeltaV APC tools such as InSight, Predict, and Neural
- Applied Modern Loop Tuning using Lambda Tuning Techniques
- Use of Emerson’s EnTech Toolkit (Collect, Tuner, and Analyse)
- Advanced Regulatory Control (Cascade, Feedforward, Ratio, Split Range, etc.)
- Process Control troubleshooting

Resident Consultant

Expert consultants from Emerson can supplement your staff by providing regularly scheduled onsite services. The frequency of visits to site depends on your specific needs and can be matched to your ever-changing control performance project demand and internal resource availability. You can schedule monthly, quarterly, biannual, or annual visits from a consultant, and you can utilize him or her on whatever Control Performance or APC projects that you may be working on at the time. Consultants can be deployed to maintain existing APC strategies, provide APC health checkups, conduct a feasibility study or audit of a process, help troubleshoot a Control Performance problem, or implement a new APC strategy. Emerson consultants can be available to support you in whatever Control Performance challenge may be important to you at the time.

Connected Services

Many programs described above traditionally require our expert consultants to your site. With advancements in remote connectivity technology, many of these programs can be delivered without the travel costs associated with sending a consultant to site. By either sending us your data or allowing us to connect to your system remotely, we can provide more frequent access to our experts at a lower total cost.

Ordering Information

Description	Model Number
Control Performance Solutions Discovery Studies	Please contact Emerson Performance Services or Your Local Emerson Sales Office.

**Emerson
North America, Latin America:**

+1 800 833 8314 or
+1 512 832 3774

Asia Pacific:

+65 6777 8211

Europe, Middle East:

+41 41 768 6111

www.emerson.com/deltav

©2017, Emerson. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.



Control Performance Solutions: Discovery Studies

- Reduce process variability and improve operational performance
- Improve process availability with less operator intervention
- Maximize the benefits of advanced control
- Justify investments made in advanced control technology



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

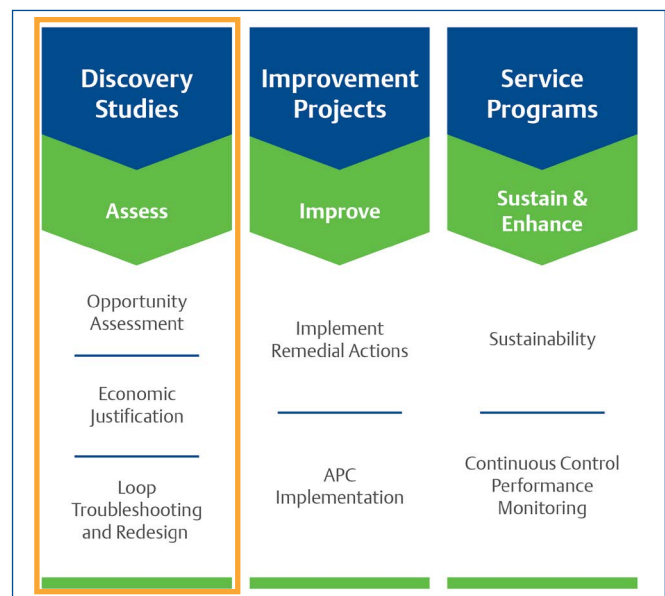
Emerson is pleased to offer process optimization expertise through the combined resources of our Control Performance consultants and our Local Business Partners. Our consultants can analyze data either on-site or off-site and provide advice and guidance on improvement opportunities. They have wide experience in the process industries including Refining, Chemical, Power, Pipelines, Pharmaceutical, Food & Beverage, Mining & Metals, Pulp & Paper and others.

Benefits

Reduce process variability and improve operational performance: 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 provide immediate recommendations such as tuning adjustments for coordinated response to load disturbances and set point changes. They also will identify longer term remedies such as valve/instrument repair or replacement needs.

Improve process availability with less operator

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

Justify investments made in advanced control technology: If you have ideas on where advanced controls can improve your operations, but struggle with understanding how much improvement is possible, let us assist you. We can help provide project justification so you can get appropriate funding, and we can layout out a reasonable improvement objective before you jump into an advanced control project.



Discovery Studies

- **Tier 1** gives access to a Process Control Consultant for a single day. The visit will include interviews with representatives from management, operations, engineering, control systems, and instrumentation staff. We will explore areas where automation technology would likely have the most significant benefits and look for areas of risk exposure. The consultant will conduct a process review, gather data manually, and provide verbal feedback on opportunities for improvement. This service typically does not include a formal report, although a brief summary of recommended actions and next steps may be provided.
- **Tier 2** involves a consultant providing more in-depth data analysis to identify process dynamics and nonlinearities, optimize controller tuning, and recommend improvements to control strategy and process design. The consultant can perform this analysis offsite, onsite, or a combination of both. This service can either be designed to find the top 10-12 improvement opportunities across a broad production area or areas, or can be tailored to analyze a specific process or production challenge.
- **Tier 3** provides the same level of service as Tier 2, but allows the consultant enough time to make immediate changes to controller tuning or control strategy. The report that is delivered will also provide a long term project opportunity roadmap and economic justification where applicable.

	Tier 1	Tier 2	Tier 3
Duration	1 day	1 week	2 weeks
Location	Onsite	Onsite and/or Offsite	Onsite and Offsite
Deliverables			
Consultant Analyzes Process Data	✓	✓	✓
Meeting to Summarize Findings and Recommendations	✓	✓	✓
Written Report		✓	✓
Immediate Improvements Implemented (tuning, control strategy modifications)			✓
Roadmap and Project Justification			✓

Onsite Service Description

During a Tier 2 or Tier 3 study, the Emerson Process Control Consultant will gather overall information about the process, which will require interviews with Process Engineers and Operations Management. This will help the consultant understand what the process objectives are, the keys to successful process performance, the particular limits or constraints of the process, and typical causes of production losses or inefficiencies.

The Consultant will utilize tools such as DeltaV InSight, DeltaV Continuous Historian, and Emerson's EnTech™ Toolkit to collect and analyze specific process control data. The Consultant will identify the root cause of underperforming loops, identify sources of excessive process variability, and whenever possible improve operational performance by minimizing such variability. Changes to tuning parameters will be applied where appropriate, and control valve repair needs will be identified.

The formal report will document the as-found conditions, summarize any changes to tuning that were made onsite, and recommendations for actions that need to be taken for further improvement. In the case of a Tier 3 study, a roadmap of further projects to consider and financial justification analysis will be a fundamental aspect of the report.

Offsite Service Description

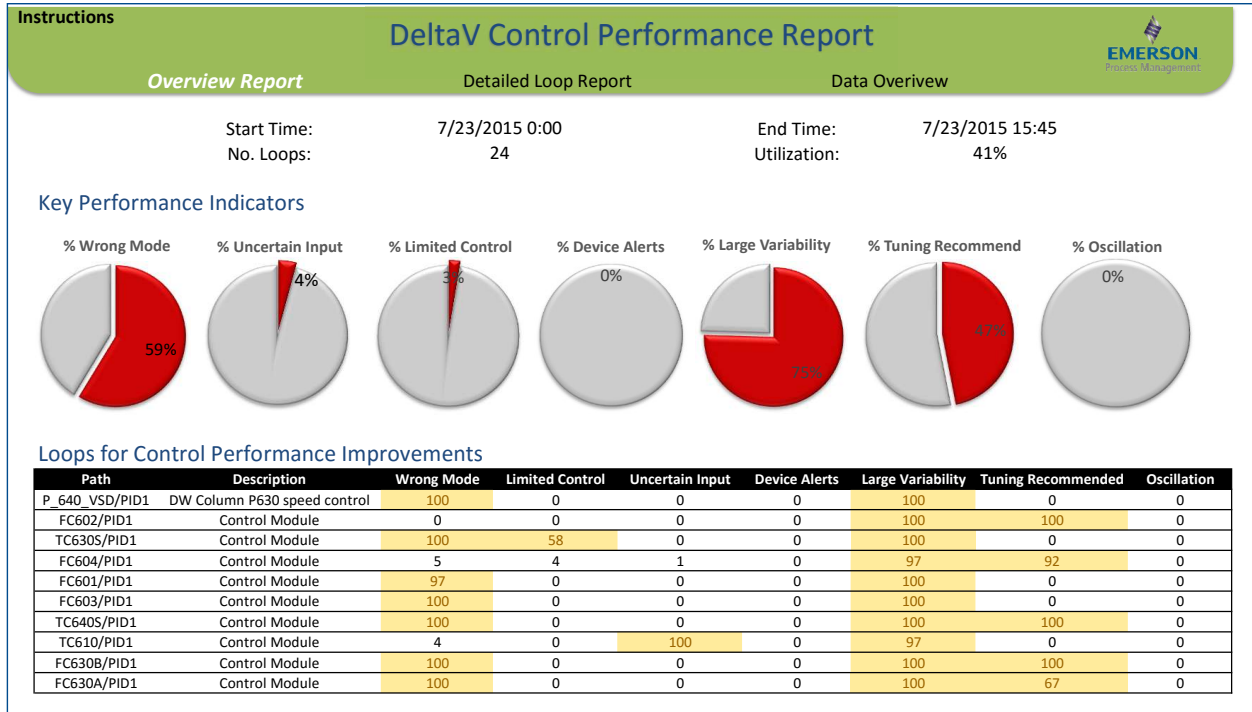
In many situations, we can tailor a Tier 2 study to allow access to our team of expert Consultants without the added cost associated with travel and living expenses. We have a global network of local field engineers who can collect pertinent data from your DeltaV Control System. The data is then transferred to Emerson Consultants for analysis using various software tools and process simulation.

This service delivers a "DeltaV Control Performance Report", which will document the findings in areas of control utilization improvements, control performance improvements, final control element issues, and other potential areas of improvements. Follow-up remedies could include loop tuning, valve calibration, repair, or replacement. Some loops may benefit from advanced process control strategies. Such opportunities will also be identified in the report and a suitable APC methodology will be presented.

Examples of Control Performance Solutions Discovery Studies

The following are examples of Emerson Control Performance Solutions Discovery Studies:

- At a Refinery, a Discovery Study identified that Diesel recovery could be increased by 3% by implementing an APC strategy on their Delayed Coker
- At an Aluminum Hydrates Plant, an Emerson Consultant made recommendations for control strategy changes and modified loop tuning which would reduce temperature variability and increase annual production by 12%
- At a PTA Plant, an Emerson consultant helped coordinate the controls and modified the tuning on the overhead pressure of a distillation column, thereby improving quality and reducing energy consumption by 7%
- At a Pharmaceutical Plant, an Emerson Consultant identified an APC algorithm that would increase throughput by 33% and increase First Pass Quality by 7%
- At a precious metals grinding mill, an offsite Tier 2 study uncovered a process interaction that could be optimized using a Model Predictive Control strategy. We simulated the process response under the new strategy and determined that throughput could be increased by about 5%.



Sample DeltaV Control Performance Report.

Ordering Information

Description	Model Number
Control Performance Solutions Discovery Studies	Please contact Emerson Performance Services or Your Local Emerson Sales Office.

Emerson
North America, Latin America:

+1 800 833 8314 or
 +1 512 832 3774

Asia Pacific:

+65 6777 8211

Europe, Middle East:

+41 41 768 6111

www.emerson.com

©2017, Emerson. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.



Control Performance Solutions: Improvement Projects

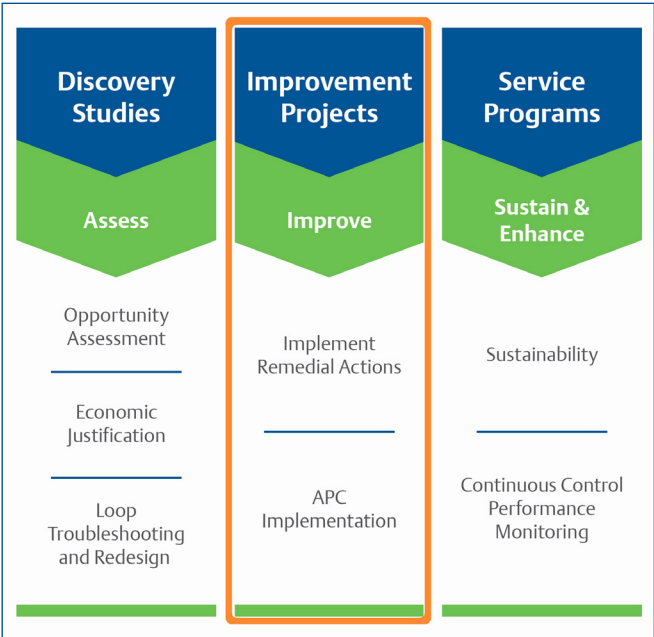
- Apply remedial actions from a Control Performance Discovery Study
- Implement Advanced Project Control schemes
- Reduce process variability and improve operational performance



Control Performance Improvement Projects can be used to solve a particular problem or to implement remedial actions previously identified as improvement opportunities

Introduction

Emerson offers process optimization expertise through the combined resources of Control Performance consultants and Emerson's Local Business Partners. Emerson consultants can help you deliver previously identified improvement opportunities through Control Performance Projects. They have wide experience in the process industries including Refining, Chemical, Power, Pipelines, Pharmaceutical, Food & Beverage, Mining & Metals, Pulp & Paper and others.



Benefits

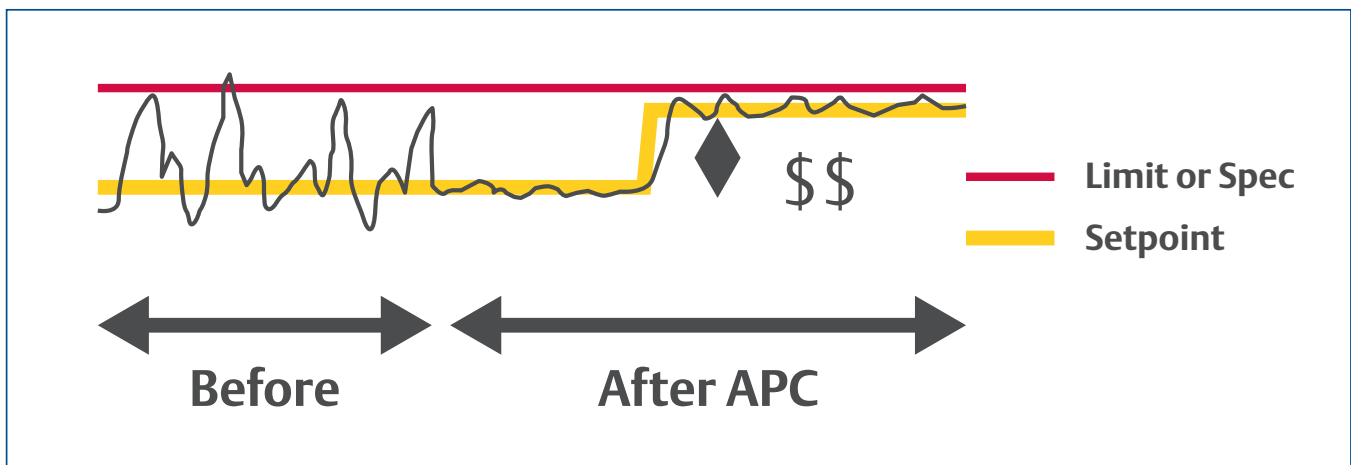
Apply remedial actions from a Control Performance

Discovery Study: At the completion of a Control Performance Discovery Study, 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 a project, a consultant will ensure the changes being made will result in tangible benefits that are aligned with your business and operational goals.

Implement Advanced Project 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 strategies, and training Neural Network models.

Reduce process variability and improve operational performance:

Once determining the root cause of loop performance issues, Emerson consultants can help you remediate these problems. Control Performance Discovery Study are designed to reduce process variability problems that can impact quality, throughput, or raw material and energy consumption. After reducing variability, the consultants will help you shift your set points to achieve more optimum process performance.



Service Description

Control Performance Improvement Projects can either be delivered to implement remedial actions identified during a Discovery Study, or help you implement a pre-defined scope of Advanced Process Control (APC) applications that you have previously identified. Emerson consultants provide turn-key services to design, configure, install and commission a wide variety of APC applications.

A typical APC Project would include the following steps:

- Regulatory control performance review
- Pre-step tests and plant test design
- Functional Design Specification (FDS) Development
- Configuration
- Step testing and data collection
- Model identification and controller building
- Controller simulation and testing
- Commissioning
- Site Acceptance Test (SAT)
- Project Post Audit

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

Example Projects

The following are examples of Control Performance Projects that Emerson has successfully delivered:

- At a precious metals grinding mill, an APC Project justified by a Discovery Study addressed a process interaction that could be optimized using a Model Predictive Control (MPC) strategy. The project implemented this new strategy and increased throughput by 5% and precious metal recovery by 1%.

- At a petrochemical plant, the implementation of MPC on a distillation column reduced steam consumption by 7% and improved recovery of the valuable product by 1%.
- At a specialty chemical plant, a new MPC strategy on a distillation column resulted in \$400K per year in energy savings.
- At a pharmaceutical plant, utilizing a new MPC strategy on a reactor increased throughput by 33%, eliminating the need for a capital project to build a new production line.
- At a refinery, a Discovery Study justified a project to implement MPC technology on their delayed coker, resulting in increased diesel recovery by 3%.

Ordering Information

Description	Model Number
Control Performance Solutions: Improvement Projects	Contact your local Emerson Sales Office or Local Business Partner.

Emerson
North America, Latin America:
 ☎ +1 800 833 8314 or
 ☎ +1 512 832 3774

Asia Pacific:
 ☎ +65 6777 8211

Europe, Middle East:
 ☎ +41 41 768 6111

🌐 www.emerson.com

©2017, Emerson. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

