MON300:
Control Quality Performance Monitoring and Adaptive Control

Duration:	**2 Days Classroom or 20 hours Online**
Audience:	**Process Control Engineers, Advanced Process Control Engineers, Instrument Engineers, Lab Technicians, DCS/PLC Technicians, Managers and Supervisors.**
Prerequisites:	**2-year or 4-year degree in engineering or operations and/or a few months of plant/ engineering experience is desirable, but not required.**
Course Material:	**Software used: Apromon and Pitops. Also custom training slides.**

Course Description and Objectives:
Chemical plants can have anywhere from about 50 PIDs in small plants to over 2000 PIDs in large refineries and integrated petrochemical complexes. In addition to simple PIDs, there are cascades, override controllers, model-based controllers and multivariable controllers.

As time goes by, even well-tuned PIDs and other controllers can slowly start to deteriorate. As deterioration progresses, process oscillations can start with small amplitudes and can grow large over time costing the plant significant monetary and/or quality losses. Or conversely, PIDs could become sluggish because of changes in process and operating conditions, once again causing the control quality to deteriorate.

This course covers the technology and application of a control performance monitoring software (Apromon) that identifies poorly controlling PIDs (includes single, cascade, override and complex PIDs). Apromon runs online using OPC and calculates several control criteria and generates control quality reports. Integrated with Apromon is a novel, breakthrough algorithm called TAD (True Amplitude Detection) that accurately isolates oscillating or sluggish controllers. This course shows how to improve and maintain the plant's primary and advanced control system and increase the plant’s profits.

This course explains how to identify control problems in an online/real-time manner and take immediate corrective action using online adaptive control. The course also shows how to implement true adaptive control inside the DCS by connecting the control quality monitoring software using OPC technology to the DCS/PLC and by designing special DCS/PLC-resident logic for triggering automatic control action.

Learning Outcomes:
At the end of the course, attendees will be skilled in understanding process control quality monitoring criteria and statistics. They will be skilled in the application, installation and use of real-time software products for process control quality monitoring at any plant.

Attendees will also be skilled on the application of online adaptive control technology using the control quality monitoring software and then linking it with closed-loop DCS based-adaptive control schemes. Using the knowledge, attendees on their own can build closed-loop adaptive control schemes at their plant inside the DCS/PLC using OPC connectivity.

Attendees will be able to significantly improve control quality at their plants, move the plant more stably and reliably in the direction of increasing profits with fewer shutdowns and fewer abnormal events. The plant will also see a reduction in the number of alarms and a reduced need for operator intervention.

Day 1:
Modern process control in plants
Process interactions because of mass balance and heat balance integration
Potential for process cycling and sustained oscillations
Causes of process oscillations
Pitops simulations illustrating different oscillation cases
Pitops simulations illustrating excessive control valve movement
Pitops simulations illustrating sluggish control
Definition of various process control quality performance criteria
Explanation of special new terms – crimp, cheat, vacillation, rope length etc.
Component breakdown of PID contributions
Use of process control monitoring software - Apromon-Excel
Run example cases on Apromon-Excel
More explanation of process control quality performance monitoring criteria

Day 2:
Conduct what-if studies on example using Apromon-Excel
Adjust and understand oscillation tuning parameters
Set up online OPC servers to simulate real-plant environment
Use of Apromon-OPC
Run example cases on Apromon-OPC
Implement Apromon-OPC using OPC simulation server
More explanation of process control quality performance monitoring criteria
Procedure and tips on implementing Apromon-OPC in a plant environment
Need for detection of online oscillation in an industrial process
Need for detection of sluggish control in an industrial process.
Precise determination of oscillation
Practical challenges of detecting oscillations reliably
Understanding of true amplitude detection) algorithm
Setting up Apromon-OPC and configuring it in online/real-time mode
Implementing online adaptive control using DCS, Apromon and a OPC server-based computer