QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 1347

Process Control and Process Optimization Training Course

PROCESS ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The Process Control and Process Optimization Training Course provides a practical and structured framework for improving process stability, operational efficiency, product or service quality, asset performance, and decision-making across complex operating environments. The course equips participants with the knowledge required to understand how process variables, control systems, operating practices, equipment condition, and performance data interact to influence operational outcomes.

For government entities, ministries, public sector organizations, oil and gas companies, utilities, manufacturing facilities, banks with critical infrastructure, and large corporations, effective process control is essential to maintaining safe, reliable, efficient, and compliant operations. Inconsistent process control can lead to variability, reduced throughput, quality deviations, higher energy use, unplanned downtime, equipment stress, increased operating cost, and avoidable operational risk.

This Process Control and Process Optimization Training Course examines the principles of process monitoring, measurement, control loops, automation, process data analysis, operational limits, alarm management, and continuous optimization. Participants will learn how to identify key process variables, establish performance baselines, evaluate control performance, recognize abnormal conditions, and use data to improve operating stability and resource efficiency.

The course also addresses the relationship between process control and maintenance, reliability, quality assurance, energy efficiency, process safety, and asset management. Participants will explore how poor instrumentation, ineffective control strategies, inaccurate data, weak operating discipline, process constraints, and inadequate maintenance can affect process outcomes. The program supports a coordinated approach between operations, engineering, maintenance, automation, and management teams.

Through case discussions, practical exercises, and implementation planning, participants will gain the ability to assess control performance, identify optimization opportunities, develop improvement actions, and monitor results. The course supports leaders in setting governance and performance expectations while enabling specialists to improve process stability, optimize operating conditions, reduce variability, and sustain operational improvement.

Objectives

- Analyze the relationship between process control, operational performance, quality, safety, energy efficiency, reliability, and cost during the course.
- Assess key process variables, operating limits, control objectives, and performance indicators for selected process systems.
- Develop process control profiles that define critical measurements, set points, control ranges, alarms, responsibilities, and escalation requirements.
- Evaluate the performance of control loops, instrumentation, automation systems, and operating procedures using practical process scenarios.
- Apply process data analysis methods to identify trends, variability, deviations, control instability, and improvement opportunities.
- Design practical optimization approaches for set points, operating windows, equipment loading, sequencing, and process constraints.
- Improve control-system reliability by identifying maintenance, calibration, instrumentation, communication, and data-quality requirements.
- Strengthen alarm management practices by assessing alarm priorities, operator response, nuisance alarms, escalation, and documentation.
- Implement structured processes for testing, validating, and monitoring optimization changes while managing operational risk.
- Assess the interaction between process control, energy use, production capacity, quality performance, maintenance, and process safety.
- Align process optimization initiatives with organizational objectives for operational excellence, compliance, sustainability, cost discipline, and business continuity.
- Develop a time-bound process control and optimization action plan for implementation after the course.

Who Should Attend

The Process Control and Process Optimization Training Course is designed for operations managers, production managers, engineering managers, process safety managers, maintenance managers, reliability managers, energy managers, quality managers, utilities managers, plant managers, facilities managers, and technical services leaders. It is particularly relevant for executives, directors, and decision makers responsible for operational performance, productivity, quality, process reliability, energy use, safety, asset availability, and continuous improvement.

The course is suitable for process engineers, chemical engineers, production engineers, mechanical engineers, electrical engineers, instrumentation and control engineers, automation specialists, maintenance engineers, reliability engineers, utilities engineers, energy engineers, quality engineers, data analysts, and technical supervisors. It is valuable for professionals involved in process design, control-room operations, field operations, equipment performance, automation, data analysis, commissioning, modification, troubleshooting, and optimization activities.

HSE, risk management, procurement, supply chain, finance, project management, digital transformation, internal audit, contractor management, and operational excellence professionals may also benefit where their responsibilities involve critical process systems, performance assurance, technology investment, process changes, compliance, energy performance, or operational risk. The course supports multidisciplinary teams that need a common method for controlling process variability, resolving operational issues, and improving system performance.

Learning Outcomes

- Explain how effective process control supports safe, stable, reliable, efficient, and high-quality operations.
- Identify critical process variables, operating limits, control objectives, and performance measures for selected systems.
- Interpret process trends, control-system data, alarms, operating records, and quality results to identify deviations and variability.
- Assess the role of instrumentation, sensors, transmitters, valves, actuators, control loops, and automation systems in process performance.
- Evaluate control-loop performance and recognize common issues, including oscillation, delay, poor tuning, sensor drift, valve problems, and unstable operating conditions.
- Develop practical control strategies that define set points, limits, alarm priorities, operator actions, and escalation arrangements.
- Identify optimization opportunities related to equipment loading, sequencing, process parameters, utility use, throughput, and operating windows.
- Apply basic process data analysis methods to support troubleshooting, root cause analysis, and continuous improvement.
- Integrate process control improvement with maintenance, calibration, inspection, reliability, process safety, and energy-management activities.

- Assess the impact of optimization changes on process safety, quality, equipment integrity, energy use, and operational risk.
- Prepare a plan for testing, validating, documenting, and sustaining process control improvements.
- Produce an initial process control and process optimization roadmap relevant to the participant's workplace.

Course Outline

DAY 01

Process Control Foundations and Operational Performance

- The strategic role of process control in operational stability, productivity, quality, reliability, safety, energy efficiency, and cost management.
- Process variables, process dynamics, control objectives, operating limits, constraints, and performance indicators.
- The relationship between process control, operations, maintenance, engineering, automation, quality, and process safety.
- Process control architectures: manual control, basic regulatory control, supervisory control, automation, and data-driven performance monitoring.

> **PRACTICAL APPLICATION OR DISCUSSION**
> Reviewing a selected operating process and identifying critical variables, control objectives, and key performance concerns.

DAY 02

Measurement, Instrumentation, and Control Systems

- Measurement principles and the role of sensors, transmitters, analysers, final control elements, valves, drives, and actuators.
- Instrumentation accuracy, calibration, reliability, maintenance, redundancy, signal quality, and common measurement problems.
- Control-loop fundamentals: feedback control, feedforward control, cascade control, ratio control, and control-loop interaction.

DAY 02 — CONTINUED

- Control-system data, historian records, trends, alarms, control-room displays, and field verification.

PRACTICAL APPLICATION OR DISCUSSION

Reviewing a process control loop and identifying measurement, actuator, control, and operational performance risks.

DAY 03

Control Performance, Alarms, and Process Stability

- Process control performance: response time, variability, oscillation, dead time, tuning, disturbances, and operating constraints.
- Identifying poor control performance through trend analysis, event records, alarm patterns, field observations, and operator feedback.
- Alarm management principles: alarm priorities, rationalization, nuisance alarms, alarm floods, response procedures, and escalation.
- Operating discipline, standard operating procedures, control-room communication, shift handover, and abnormal situation management.

PRACTICAL APPLICATION OR DISCUSSION

Analyzing sample process trends and alarms to identify instability, likely causes, and improvement priorities.

DAY 04

Process Optimization and Performance Improvement

- Process optimization principles: performance baselines, operating windows, constraints, throughput, yield, quality, energy use, and resource efficiency.
- Optimizing set points, equipment loading, process sequencing, utility consumption, start-up, shutdown, and idle-time operation.
- Using process data, Pareto analysis, variance analysis, root cause analysis, and mass and energy balances to identify improvement opportunities.

DAY 04 — CONTINUED

- Evaluating optimization alternatives using safety, technical feasibility, quality, reliability, operating risk, cost, and lifecycle value.

PRACTICAL APPLICATION OR DISCUSSION

Developing process optimization opportunities for a selected process, utility system, or operational scenario.

DAY 05

Implementation, Governance, and Sustainable Optimization

- Managing process changes, testing control changes, validation methods, approval requirements, documentation, and communication.
- Integrating process control improvement with maintenance plans, calibration programs, reliability initiatives, inspection requirements, and training.
- Performance measurement: control stability, quality variation, throughput, yield, energy use, alarms, downtime, and operating compliance.
- Governance, performance reviews, action tracking, management of change, lessons learned, and continuous improvement cycles.

FINAL WORKSHOP, ACTION PLAN, OR IMPLEMENTATION EXERCISE

Developing a 90-day Process Control and Process Optimization action plan with priority issues, proposed actions, accountable owners, milestones, performance indicators, and review mechanisms.

Register or Request More Information

Course page: https://quest-training.com/courses/process-control-and-process-optimization-training-course
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