

Course No. 1350

Process Flow Diagrams (PFD) & Piping and Instrumentation Diagrams (P&ID) Training Course

PROCESS ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Process Flow Diagrams (PFD) & Piping and Instrumentation Diagrams (P&ID) Training Course provides a practical and professional framework for understanding, developing, reviewing, and using two of the most important technical documents in process industries and asset-intensive operations. The course enables participants to interpret process design information accurately, communicate technical requirements clearly, and support safer, more reliable, and more efficient operations.

PFDs and P&IDs are essential throughout the lifecycle of a facility, from conceptual design and engineering through procurement, construction, commissioning, operation, maintenance, modification, shutdown, and decommissioning. For government entities, ministries, public sector organizations, oil and gas companies, utilities, manufacturing facilities, water and power operators, banks with critical infrastructure, and large corporations, accurate diagrams provide a controlled source of information for managing complex systems, operational risks, equipment interfaces, and technical change.

This Process Flow Diagrams (PFD) & Piping and Instrumentation Diagrams (P&ID) Training Course explains the role, structure, and application of PFDs and P&IDs in process engineering, operations, maintenance, reliability, process safety, asset management, and project delivery. Participants will learn how to identify process equipment, major material and energy streams, process conditions, piping arrangements, valves, instruments, control loops, alarms, safety devices, isolation points, and utility connections.

The course also addresses the differences between PFDs and P&IDs, their relationship with process descriptions, equipment data sheets, piping line lists, cause-and-effect charts, operating procedures, and maintenance documentation. Participants will learn how to review diagrams for completeness, identify inconsistencies, assess operational and maintenance implications, and support effective management of change.

Through practical drawing reviews, case discussions, and workshop exercises, participants will gain the ability to use PFDs and P&IDs as operational tools rather than static engineering documents. The course supports executives and managers in strengthening technical governance, while equipping engineers, supervisors, operators, maintenance specialists, and project teams with practical skills for improving communication, safety, design assurance, and operational readiness.

Objectives

- Analyze the role of Process Flow Diagrams and Piping and Instrumentation Diagrams across process design, operations, maintenance, reliability, process safety, and asset lifecycle management during the course.
- Assess the differences between PFDs and P&IDs and identify the appropriate use of each document in technical, operational, and project decisions.
- Develop the ability to interpret process equipment, major streams, operating conditions, utilities, and process relationships from a Process Flow Diagram.
- Evaluate piping arrangements, valves, instruments, control loops, alarms, interlocks, safety devices, and isolation points shown on a P&ID.
- Apply common diagram symbols, tagging principles, line identification, equipment numbering, instrument notation, and document-control practices.
- Design practical review checklists for verifying the completeness, consistency, and usability of PFDs and P&IDs.
- Improve operational readiness by identifying start-up, shutdown, isolation, bypass, drain, vent, sampling, and maintenance requirements from P&ID information.
- Strengthen process safety by assessing diagram information related to relief systems, alarms, trips, emergency shutdown functions, safeguards, and hazardous interfaces.
- Implement effective management of change practices that ensure PFDs and P&IDs are reviewed, approved, updated, and communicated after modifications.
- Assess the relationship between PFDs, P&IDs, operating procedures, cause-and-effect charts, equipment data sheets, line lists, and maintenance documentation.
- Develop cross-functional communication practices between engineering, operations, maintenance, HSE, projects, contractors, and management through controlled technical documentation.
- Prepare a time-bound action plan to improve the use, review, and governance of PFDs and P&IDs within the participant's organization.

Who Should Attend

The Process Flow Diagrams (PFD) & Piping and Instrumentation Diagrams (P&ID) Training Course is designed for engineering managers, operations managers, maintenance managers, reliability managers, process safety managers, project managers, asset managers, plant managers, facilities managers, utilities managers, and technical services leaders. It is particularly relevant for

executives, directors, and decision makers responsible for technical governance, capital projects, operational risk, process safety, plant modifications, asset integrity, regulatory compliance, and business continuity.

The course is suitable for process engineers, chemical engineers, mechanical engineers, piping engineers, project engineers, design engineers, instrumentation and control engineers, automation specialists, electrical engineers, maintenance engineers, reliability engineers, inspection engineers, integrity specialists, operations engineers, shift supervisors, control-room operators, field operators, planners, and technical document controllers. It supports personnel involved in process design, commissioning, operations, maintenance, troubleshooting, inspection, modification, shutdown planning, and engineering assurance.

HSE, quality, risk management, internal audit, procurement, supply chain, contractor management, emergency response, digital transformation, operational excellence, and facilities professionals may also benefit where their responsibilities intersect with process documentation, safety-critical systems, equipment modifications, contractor work scope, technical reviews, emergency arrangements, or compliance assurance. The course promotes consistent understanding and stronger collaboration among multidisciplinary teams.

Learning Outcomes

- Explain the purpose and lifecycle value of PFDs and P&IDs in process facilities, utilities, infrastructure, and operational systems.
- Distinguish between Process Flow Diagrams and Piping and Instrumentation Diagrams and identify the information provided by each.
- Interpret process equipment, major material streams, energy streams, process conditions, recycles, utilities, and operating relationships from a PFD.
- Identify piping, equipment tags, valves, instruments, control loops, alarms, interlocks, drains, vents, sample points, and safety devices from a P&ID.
- Apply common symbols, tagging conventions, line numbering, equipment identification, instrument notation, and drawing-revision controls.
- Trace process flow and operating sequences through a selected system using PFD and P&ID information.
- Identify operational requirements for start-up, normal operation, shutdown, isolation, maintenance access, draining, venting, and equipment handover.

- Assess diagram information related to process safety, pressure relief, emergency shutdown, alarms, safeguarding, and hazardous energy isolation.
- Review PFDs and P&IDs for technical consistency, missing information, practical operability, maintainability, and document-control issues.
- Link diagrams with operating procedures, equipment data sheets, line lists, cause-and-effect charts, maintenance plans, and management of change records.
- Participate more effectively in design reviews, HAZOP studies, operational readiness reviews, maintenance planning, and project handover activities.
- Produce an initial action plan for improving diagram quality, review processes, and technical document governance in the workplace.

Course Outline

DAY 01

Foundations of PFDs, P&IDs, and Process Documentation

- The purpose and strategic value of PFDs and P&IDs in engineering, operations, maintenance, asset integrity, process safety, and project management.
- The process facility lifecycle: concept, design, construction, commissioning, operation, modification, shutdown, and decommissioning.
- Differences between PFDs, P&IDs, process descriptions, equipment data sheets, line lists, cause-and-effect charts, and operating procedures.
- Document hierarchy, document control, drawing numbers, revisions, approvals, ownership, controlled copies, and as-built requirements.

PRACTICAL APPLICATION OR DISCUSSION

Reviewing a process documentation set and identifying the role of each document in operational decision-making.

DAY 02

Reading and Interpreting Process Flow Diagrams

- PFD structure, process blocks, equipment representation, stream numbering, process flow direction, and boundary definition.
- Major process equipment: vessels, pumps, compressors, heat exchangers, separators, filters, distillation columns, furnaces, and utility systems.
- Material and energy streams, flow rates, temperatures, pressures, composition, heat duties, recycles, side streams, and process conditions.
- Using PFDs to understand process sequence, capacity, mass and energy balances, utility requirements, and major operating constraints.

PRACTICAL APPLICATION OR DISCUSSION

Interpreting a selected PFD and tracing the process flow, major equipment, process streams, and utility requirements.

DAY 03

Reading and Interpreting Piping and Instrumentation Diagrams

- P&ID structure, equipment tags, piping lines, line numbers, pipe specifications, flow direction, valves, fittings, drains, vents, and sample points.
- Instrumentation symbols, transmitters, indicators, controllers, control valves, actuators, alarms, switches, and control loops.
- Control strategies, manual and automated control, cascade and ratio control, interlocks, permissives, alarms, and shutdown functions.
- Isolation, bypasses, relief valves, flare or vent connections, emergency shutdown arrangements, and maintenance access considerations.

PRACTICAL APPLICATION OR DISCUSSION

Reviewing a P&ID to identify process flow, instruments, control loops, isolation points, and safety-critical components.

DAY 04

PFD and P&ID Review for Operations, Maintenance, and Process Safety

- Using diagrams to support start-up, shutdown, equipment isolation, draining, venting, flushing, purging, cleaning, and handover activities.
- Reviewing operability, maintainability, accessibility, inspection needs, critical spares, valve locations, and instrument-maintenance requirements.
- Process safety review: relief systems, alarms, trips, emergency isolation, hazardous interfaces, safeguarding, and human-factor considerations.
- Using PFDs and P&IDs in HAZOP, LOPA, management of change, pre-startup safety reviews, incident investigations, and root cause analysis.

PRACTICAL APPLICATION OR DISCUSSION

Conducting a structured P&ID review for operational, maintenance, and process safety concerns.

DAY 05

Governance, Management of Change, and Technical Assurance

- Management of change requirements for modifications to process equipment, piping, instrumentation, controls, and safety systems.
- Updating PFDs and P&IDs, managing red-line mark-ups, revision control, verification, approval, communication, and as-built documentation.
- Technical review processes, multidisciplinary design reviews, contractor coordination, quality assurance, and project handover.
- Building organizational capability through training, drawing libraries, digital document management, audit routines, and continuous improvement.

FINAL WORKSHOP, ACTION PLAN, OR IMPLEMENTATION EXERCISE

Developing a 90-day PFD and P&ID improvement plan with priority documents, review actions, accountable owners, milestones, governance controls, and performance measures.



Register or Request More Information

Course page: <https://quest-training.com/courses/process-flow-diagrams-pfd-piping-and-instrumentation-diagrams-pid-training-course>

Website: <https://quest-training.com>

Email: info@quest-training.com

Phone: +905016771440

