P&ID (Piping and Instrumentation Diagram) and Engineering Drawings Interpretation

Duration

Two classroom days providing 1.6 CEU (Continuing Education Credits) or 16 PDH (Professional Development Hours)

Summary

This two-day course focuses on engineering drawings typically used in the chemical and process industries by engineers and technologists in the design phase, and by operations and maintenance staff once facilities are up and running. It is suitable for anyone interested in how drawings should be interpreted, created, maintained, and used in assessing emergency situations and regulatory compliance issues. The combination of classroom instruction and workshop exercises focuses on critical documentation essential to the safe day-to-day operation of facilities (e.g., P&ID, PFD, Plot Plan, Electrical Area Classification, Piping Drawing, Isometric Drawing, Line List, Tie-In List and Shutdown Keys).

Who Should Attend

- Facilities, Operations and Maintenance Professionals
- Engineers In Training (EITs)
- I & C, Mechanical Engineers and Technologists
- Professionals responsible for Process Hazards Analysis, HAZOP studies or Safeguarding studies
- Health & Safety / HSE Professionals

Participants will learn to

1. Explain the relationship of P&ID drawings to facilities and appraise the potential for safety improvements.
2. Understand and evaluate the purpose, content, and importance of process/electrical and engineering drawings from company plants.
3. Interpret P&ID drawings, including valves, equipment, and control/safety systems.
4. Develop and implement strategies to maintain current and accurate drawings throughout the lifecycle of the facility.
5. Provide engineers with the skills to communicate in the same “language” as facility operators during Management of Change scenarios.
6. Recognize emergency situations and assess safety, environmental and regulatory compliance issues such as Process Hazards Analysis (PHA)/HAZOP studies.
7. Construct a foundation for base-level learning and support consistent improvement in quality, staff and leadership communications, and other processes which rely on P&ID drawings.

COURSE SYLLABUS

Course Outline

- Introduction
- Preliminary Engineering Drawings
- Piping and Instrumentation Diagrams
- Interpreting P&IDs - Valves
- Interpreting P&IDs - Equipment
- Interpreting P&IDs - Control and Safety Systems
- Detailed Engineering Drawings
- Engineering Drawings for Construction and Operation

Course Agenda

Day One

1. Introduction
2. Preliminary engineering drawings
    a. Block flow diagram (BFD)
    b. Process flow diagram (PFD)
    c. Material balance
    d. PFD symbols
3. Piping and instrumentation diagrams
    a. Piping and instrumentation diagram (P&ID)
    b. P&ID symbols
    c. Line numbering
    d. Valve numbering
    e. Equipment identification
    f. Abbreviations
4. Interpreting P&IDs - valves
    a. Valve types
    b. Valve identification
    c. Valve fittings
5. Interpreting P&IDs - equipment
    a. Vessels
    b. Pumps
    c. Heat exchangers
    d. Compressors
    e. Equipment identification
6. Drawing interpretation workshop #1

Day Two

7. Interpreting P&IDs – control & safety systems
    a. Distributed control systems (DCS)
    b. Safety instrument system (sis)
    c. Instrument symbols
    d. Instrument signal lines

   e. Pressure instruments
   f. Temperature instruments
   g. Flow instruments
8. Detailed engineering drawings
   a. Plot plan
   b. Electrical area classification
   c. Piping drawing
   d. Isometric
   e. Material take off
   f. Line list
   g. Tie-in list
   h. Shutdown key
9. Drawing interpretation workshop #2
10. Engineering drawings for construction and operation
   a. Developing as-builds
   b. Preparing for a PHA (HAZOP, what-if, etc)
   c. Management of change (MOC)
11. Capstone exercise
12. Course wrap-up

Instructor

Marcel Leal-Valias – Lead Instructor

Marcel has 50 years of engineering, process design and drafting, mechanical maintenance, and project management experience. He has worked as a Piping Manager, Construction Site Manager, and Project Manager, and has a broad operational understanding of all exploration, production, and refining aspects of the oil and gas industry. Mr. Leal-Valias has 15 years experience as an internationally respected Process Hazards Analysis (PHA/HAZOP) trainer and facilitator, and has performed hundreds of PHA studies worldwide.

Jamie Merriam

Mr. Jamie Merriam is an Electrical Engineer (automation) with over 24 years of experience in the energy industry. His experience includes construction, maintenance and project engineering. Mr. Merriam began leading HAZOP/LOPA reviews in 2002 as part of his duties with Suncor. Now with ACM, Mr Merriam continues to support Suncor, Cenovus and other clients execute effective hazard analysis. He has applied knowledge in Instrumentation, Process Control and Functional Safety for the energy industry. Mr. Merriam's communication and leadership skills, combined with his understanding of Process Safety make him an effective and competent facilitator and educator. Mr. Merriam is a professional engineer and TÜV Functional Safety Engineer.

Richard Carter

Richard Carter is a Professional Engineer, and is qualified as a Functional Safety Engineer (F.S. Eng.) in Process Hazards and Risk Analysis through the TÜV Rheinland Functional Safety Program.Richard is an

experienced facilitator of Process Hazards Analysis (PHA) studies, such as Hazard and Operability (HAZOP), Layer of Protection Analysis (LOPA), Hazard Identification (HAZID) and What-If Analysis. He has facilitated more than 120 PHA studies for some of the largest operating and engineering organizations in Canada and the United States, and has field experience in oilsands and petrochemicals facilities. Richard is a training instructor, and teaches the 2-day P&ID/Engineering Drawings Interpretation course, the 1-day Introduction to Process Hazards Analysis course, and the 3-day PHA/HAZOP Facilitation course at ACM Facility Safety. He has also managed ACM's education and training program for public and private offerings, and developed customized PHA procedures and education materials to meet the specific needs of clients.

Course Dates

Please visit the course details webpage for currently scheduled course dates.

Available for In-House Group Delivery

This course is available for In-House Training and the content can be customized to suit the needs of your organization. For more information or to request a proposal, please email inhouserequests@peice.com or call 713-482-3858 (USA), 403-284-1250 (Canada) or 011 44 20 7280 3333 (International).