

PD410 Detail Engineering of Piping Systems

Day One

- Piping Terminology
 - Process flow diagram (PFD), piping and instrumentation diagram (P&ID), and piping and instrumentation functions, equipment functions
- Piping Components
 - Isometric and orthographic drawings, specifications and bills of material for piping drawings, valve and piping fitting function, and process and utility piping
- P&ID's
 - Development of P&ID (Piping and Instrumentation Diagram) from PFD (Process Flow Diagram), Symbols ISA 5.1, Instrumentation and Designations, P&ID's as Relational Databases.

Day Two

- Pipe Supports and Hangers
 - Selection and location, anchors, guides, restraints, spring hangers – variable and constant, limit stops, skewed restraints, sliding supports
- Steam and Condensate Piping
 - Steam traps, condensate collection systems, and drip legs
- Pump Piping
 - Forces and moments on pump nozzles, American Petroleum Standard (API) 610, ASME B73.1, commissioning, preventative maintenance, sizing and selection of pumps, TDH, and NPSH pump calculations
- Pipe Sizing
 - Pressure drop calculations, friction loss, water, viscosity, air, gases.

Day Three

- Piping Stress Analysis
 - Stress analyst's function, flexibility, tips for flexible layouts, codes and regulations, B31.1, B31.3, scope of code rules, minimum flexibility requirements, factor 'f', steam turbines nozzle loads, centrifugal and reciprocating compressor nozzle loads, shell and tube heat exchanger nozzle loads, short cut methods of analysis, use of stress analysis software, building flexibility into your layout
 - Static analysis model – building, completing analysis, interpret results and modify model to lower stresses, loads and moments if required.