

Course Content



Title: Pressure Equipment Engineering Fundamentals

Potential PDH: 32 **Code:** BTT073

Description:

This 3 day course provides students essential knowledge for managing process equipment in a plant environment. Design and post-construction considerations for pressure vessels, heat exchangers, fired heaters, boilers, piping, and tanks are presented with an applied emphasis. For example, rather than focusing on the many design rules in Section VIII Division 1, students learn to check flange ratings as the first step of a rerate. Practical information is brought to life with case-studies, examples, and practice problems throughout the course, taught by expert instructors with many combined decades of plant experience and learnings.

Outline:

What is Pressure Equipment?

Regulations, Codes and Standards (20-30 minutes max?)

- Jurisdictions
 - State regulations and NBIC vs. the ASME B&PV Code
 - Code states and non-code states
 - RAGAGEP
- Design codes
 - Design responsibility
 - Company standards
- In-Service Codes and Standards
 - FFS vs. rerating
 - API 510 and API 570
 - Design guidelines in conflict with design codes

Pressure Vessels

- Codes & standards – basis and margin
 - ASME VIII-1
 - ASME VIII-2 and ASME I
 - Code cases
- Loads
 - Pressure and temperature
 - System loads
 - Wind and seismic
 - External pressure/vacuum
 - Thermal stress
- Special services
 - Creep
 - Fatigue
 - Hydrogen
 - Cryogenic
- Supports and internals
 - Horizontal vessels
 - Vertical vessels
 - Internal supports and allowables

Course Content

- Rerates
 - Flange ratings
 - Carbon steel and temperature rerates
 - Pressure rerates
 - Legacy materials
- Undocumented equipment
- Specifying new equipment
- Piping
 - Codes and standards
 - Conditions beyond design
 - Supports
 - Piping vs. pipelines
 - Vibration mitigation
- Heaters Transfer Equipment
 - Heat exchangers
 - ASME VIII-1 vs TEMA
 - Common design details
 - Design rules of thumb
 - Troubleshooting
 - Vibration
 - Fired heaters
 - Design and in-service codes
 - Tube rupture
 - Boilers
 - Fired boilers and ASME I
 - Unfired steam generators and ASME VIII vs. ASME I
- Bolted Joints
 - ASME VIII-1 Mandatory Appendix 2 vs. ASME PCC-1
 - ASME PCC-1 and integrity program basics
 - Selecting bolting
 - Selecting gaskets
 - Common problems and solutions
- Tanks
 - Codes and standards
 - Common damage
 - Inspection
- Maintenance and Turnarounds
 - Reliability basics (MI programs, RBI)
 - Repairs and ASME PCC-2
 - API 510 and API 570
 - Nondestructive Examination (NDE)
 - Refractory lined equipment
 - Fitness-for-Service
 - Common damage mechanisms
 - Levels
 - Level 3 triggers
 - Required information
 - Data needs and collection
 - Metal loss

Course Content

Page 3 of 3

- Brittle fracture (screening)
- Hot spots
- Introduction to fracture and creep
- Developing maintenance packages
- Checking 3rd party work

Instructor:

Everett Chatham has over 20 years of experience with deep bolted joint and mechanical expertise across plant equipment in the refining, petrochemical, and chemical industries from his many years at Shell, Lyondell Houston Refinery, and Dow Chemicals. Everett developed scope of work for repairs and alterations to pressure equipment including vessels, piping, tanks and bolted joints analysis. He holds a BS degree in Science Mechanical Engineering from Texas A&M University.