ASME Code Design Requirements for High Pressure High Temperature (HPHT) Well Head Equipment

A Practical, Case Study-based Training Program
Led by:

Daniel T. Peters, PE

One day • .8 CEUs • 8 PDHs

About this MasterClass (MC128)
ASME B&PV Code Section VIII Division 3 contains mandatory requirements, specific prohibitions, and non-mandatory guidance for the design, materials, fabrication, examination, inspection, testing, and certification of high pressure vessels and their associated pressure relief devices. The rules and methodology have been applied and referenced extensively for the construction of High Pressure High Temperature (HPHT) Wellhead Equipment. This one-day MasterClass provides an overview of the rules and parameters of the Code that can have a significant impact on these designs. This includes an overview of the analysis methods used, including the application of FEA in meeting the requirements of the Code. Examples are discussed to demonstrate the philosophy of the Code criteria.

Venue/Location
Held in conjunction with the 2016 Offshore Technology Conference, this course will take place on May 1, 2016, at the George R. Brown Convention Center (ORB), 1001 Avenida De Las Americas, Houston, Texas.

For OTC information and to register, visit http://2016.otcnet.org/Content/OTC-Training-Courses
About this MasterClass

This MasterClass provides an overview of the design methodology and philosophy of ASME Section VIII Division 3, Alternative Rules for High Pressure Vessels, which incorporates an overview of the analysis methods used, including the application of FEA, to meet the requirements of the Code and how it can be applied to High Pressure High Temperature (HPHT) Wellhead Equipment.

Examples of practical applications for many of the techniques are discussed to demonstrate the philosophy of the Code criteria. This includes an overview of the problems presented in ASME PTB-5-2013, ASME Section VIII Division 3 Example Problem Manual. Detailed scenarios are examined to illustrate how the analytical techniques are applied, and their respective limitations. An overview of key elements of the materials, fabrication sections, and special construction techniques will be discussed, as well as an overview of fatigue calculations and life assessment.

Upon completion, attendees will be able to

- Apply the rules of ASME Section VIII Division 3 to high pressure equipment design
- Evaluate the life of a component using ASME Section VIII Division 3 philosophy
- Explain some of the limitations of the ASME Section VIII Division 3 in reference to pressure equipment design

Who Should Attend

This course is intended for pressure equipment engineers working for owner-users, manufacturing, or engineering and design firms in the high pressure high temperature wellhead industry. This may include refining, petrochemical, or upstream petroleum industries, who either directly use or refer to ASME Section VIII Division 3.

About this ASME Master

Daniel T. Peters, PE, is an internationally recognized expert in the design and analysis of pressure equipment and pressure vessels, specializing in high-pressure equipment. He is currently an Associate with Structural Integrity Associates, Inc. and works in the area of pressure vessel and piping design, analysis, fitness for service, and asset management. He has applied engineering principles to the in-service inspection of equipment and long term asset management. This includes remaining life assessment utilizing fracture mechanics and fatigue, flaw evaluation and practical application of NDE techniques.

Mr. Peters has collaborated extensively with ASME BPV Code Sections II and VIII Divisions 1, 2, and 3 and ASME Post Construction Committees. He has been a member of the Subgroup on High Pressure Vessels (primarily responsible for Section VIII Division 3) for 15 years and Chairman for the past six years. He is a past Chair of the ASME Pressure Vessel and Piping Division’s High Pressure Technology Committee and the Pressure Vessels and Piping Division. He has authored or coauthored several papers in this area with subject matter including cycle life of pressure vessels and high pressure components and stress concentration factors at cross-bores of cylinders.

Mr. Peters earned his Bachelor degree from Penn State University and his Master’s degree from Gannon University. He is a registered Professional Engineer in eleven states including Ohio, Pennsylvania and Texas. He is an ASME Fellow and has received numerous awards for his contributions to both ASME Codes and Standards and with the Pressure Vessels and Piping Division.

For information on other MasterClass programs, visit http://go.asme.org/masterclass
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Wellhead Equipment (MC128)

AGENDA

The contents are tentatively organized as shown. The schedule allows for ample discussion and interaction with attendees. The instructors reserve the right to modify the content to address the audience’s needs and preferences.

Sunday, May 1, 8:00am – 5:00pm

1. Background and Development of ASME BPV Code VIII-3
   a. Overview of VIII-3
   b. Discussion of VIII-3 Criteria
   c. User’s Design Specification Overview
   d. Key References
   e. ASME PTB-5 VIII-3 Example Problem Manual

2. Materials
   a. Overview of Materials Used
   b. Mechanical Property Testing and Locations
   c. Toughness Requirements

3. Basic Concepts in VIII-3, Design by Analysis
   a. Key Definitions – Liners, Layers, Leak before Burst, Design Pressure, Design Temperature, etc.
   b. Loadings

4. Linear Elastic Stress Analysis Method
   a. Overview
   b. Stress Categories and their Stress Limits
   c. Local Failure
   d. Elastic Stress Analysis Method – Example

5. Nonlinear Stress Analysis Method
   a. Design By Analysis – Global, Local and Hydrotest
   b. Stress Definitions
   c. Stress Equations – Design Pressure / Principal Stresses
   d. Design with Non-Linear Material Models – KD-230

6. Fundamentals of Nonlinear Ratcheting
   a. Ratcheting Overview
   b. Definitions
   c. Elastic-Plastic Modeling of Ratcheting Using FEA
   d. Cyclic Plasticity

7. Design for the Protection of Fatigue
   a. Definition
   b. VIII-3 Fatigue Analysis – Overview
   c. Fatigue Assessment Methods
      i. Fatigue Curves
      ii. Fracture Mechanics
   d. Fatigue Assessment Methods – Examples for Comparison
   e. Fatigue Assessment Methods – References

8. Overview of Special Design Topics ASME VIII-3
   a. Autofrettage
   b. Closures, Heads, Fasteners and Seals
   c. Layered Construction
   d. Environmental Considerations including Hydrogen