

Tubular Design Technology Training

This session covers all relevant subjects required to understand the structural mechanics of downhole tubulars and gain proficiency and confidence in developing a safe and cost-effective casing design. Material aspects, connection selection, load cases, design factors, and buckling are just a few of the many topics that are covered. Participants will be made aware of procurement planning required to deliver equipment as designed to the rig.

- A. Introduction to Casing and Tubing Design - *Instructor and student introductions are made in order to familiarize the instructors with each participant's background. A casing and tubing design overview is provided and the course outline is discussed.*
 - 1. Course Objectives
 - 2. Training Methodology

- B. Basic Concepts-Mechanics of Tubular Strings - *In this section the fundamental concepts of casing and tubing design are presented. These elements provide the foundation for the remainder of the course.*
 - 1. Stress & Strain
 - 2. Buoyancy
 - 3. Free Body Diagrams
 - 4. Design Factors

- C. Material Aspects - *This section takes an in depth look at the material aspects of design. Basic material science concepts are followed by a detailed look at pertinent sections of API 5CT and NACE MR0175.*
 - 1. Pipe Functions
 - 2. Pipe Designation - Size, Weight, Grade, End Finish
 - 3. Pipe performance properties—Toughness, hardness
 - 4. Steel Chemistry

- D. Connection Selection – *This section covers both API and proprietary connection selection for drilling and production applications.*
 - a. API—(Based on API 5B)
 - b. Proprietary—(All popular connection styles and brands will be discussed)

- E. Fundamental Design Principles - *Load calculation methods for each of the five design factors are presented in this section. A significant amount of the lecture is devoted to the correct method for calculating axial load. Buckling calculations are simple once the participants have mastered the above.*
 - 1. Conventional and Service Life Design Methods
 - a. Burst
 - b. Collapse
 - c. Tension/Compression
 - d. Triaxial
 - 2. Buoyancy and Buoyancy Factors
 - 3. Free Body Diagrams
 - 4. Buckling and Casing

- F. Casing Loading and Design Considerations - *Load cases from various operators are presented and the importance of Load Case rationalization is discussed.*
1. Service Load Cases
 2. Load cases applied to Student Applications
- G. Corrosion Resistant Alloys – This section covers the different chemical compositions and microstructures for CRAs. In addition, their resistance to aggressive environments such as CO₂ and H₂S is discussed.
1. Martensitic
 2. Duplex
 3. Austenitic
 4. High Nickel
- H. Tubing Loading and Design Considerations - *Load cases from various operators are presented and the importance of Load Case rationalization is discussed. Students are asked to set up their own design and analysis situations.*
Build Confidence! Design your own well. Instructors will provide input and guidance only as necessary.
- I. Procurement Planning—*Once the well plans and designs have been finalized, all the components must be procured and delivered to the rig.*
Quality assurance – Manufacturer to rig!

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