



N740: Introduction to HPHT Well Design

Instructor(s): Robello Samuel

Format and Duration

Classroom - 2 Days

Virtual - 4 Sessions

Summary

This course provides a comprehensive overview of basic well design specific to high-pressure, high-temperature (HPHT) reservoirs. Participants will be introduced to key areas of focus essential for effective HPHT well design. It also discusses the impact of temperature and pressure on well barriers, highlighting the unique challenges that HPHT reservoirs present to well barrier elements. Additionally, participants will learn about operational practices that are crucial for designing and executing HPHT wells successfully.

Business Impact: By understanding the unique challenges of HPHT reservoirs, participants will be equipped to design safer, more reliable wells, reducing the risk of failure and costly interventions. Improved well barrier integrity and optimized operational practices will enhance well control, lower non-productive time, and improve the overall efficiency and safety of HPHT drilling programs.

Learning Outcomes

Participants will learn to:

1. Analyze the complexities associated with high-pressure, high-temperature (HPHT) reservoirs.
2. Evaluate the impact of HPHT conditions on well barriers and their performance.
3. Design effective well designs and select appropriate barrier elements specifically for HPHT reservoirs.
4. Demonstrate awareness of well control practices essential for HPHT operations.
5. Assess the impact of formation evaluation tools on the development and management of HPHT wells.
6. Identify the operational considerations critical to the successful execution of HPHT wells.

Training Method

This is a classroom or virtual classroom course comprising a mixture of lectures, discussions, case studies, and practical exercises.

Who Should Attend

This course is intended for Drilling Engineers, Completions Engineers, Drilling Supervisors, Drilling Superintendents, and other professionals involved in HPHT well design and operations.

Course Content

1. Definition
2. Well construction / well operations barrier elements / barrier testing and monitoring
 - Casing / tubing



N740: Introduction to HPHT Well Design

Instructor(s): Robello Samuel

Format and Duration

Classroom - 2 Days

Virtual - 4 Sessions

- Specific casing design load
- Temperature deration
- Casing selection
- Connection selection (tests and qualifications)
- Casing wear
- Corrosion – H₂S and CO₂
- Design factors
- Impact of dogleg severity
- Casing design software
- Drilling Fluids
 - Mud type and selection
 - ECD
 - Temperature effect and barite sag
 - Compressibility
 - Fluid stability
- Casing hangers
 - Casing hanger loads
- Cementing for HPHT wells

3. Well Design

- Trajectory – impact of dogleg severity
- Torque and drag
- Wellbore stability
- Annular pressure build up – design of mitigation measures
- Wellhead growth / thermal expansion
- BHA / Downhole tool selection
- Hands-on exercise

4. Well Operations

- Connection make-up
- ECD management
- Well control consideration – early kick detection, connection flow checks etc.
- Typical causes of surface flow – Kick / Wellbore breathing / supercharging / thermal expansion / compressibility effect
- Tripping procedures

5. Rig equipment

- Ratings – circulatory system / pressure control system
- Special rig equipment - Mud cooler