

N739: Horizontal Drilling & Extended Reach Drilling

Instructor(s): Robello Samuel

Format and Duration

Classroom - 2 Days Virtual - 4 Sessions

Summary

This course provides an in-depth examination of well construction technologies and the reservoir characteristics necessary for designing horizontal and multibranch wells. Participants will gain a comprehensive understanding of specialized drilling strategies, including horizontal drilling, extended reach drilling, underbalanced drilling, and coiled tubing drilling. The course will also cover geosteering techniques and the use of special downhole tools. Additionally, participants will explore methods for stimulation and sand control specifically tailored for horizontal and extended reach wells, equipping them with the knowledge and skills needed to effectively manage these complex drilling operations.

Business Impact: Participants will learn to design and execute complex wells that increase reservoir contact, improve productivity, and reduce drilling risks. With skills in geosteering, stimulation, and advanced completions, they'll enhance recovery, lower costs, and optimize field development outcomes.

Learning Outcomes

Participants will learn to:

- I. Describe the operations carried out during horizontal and extended drilling.
- 2. Contribute to the design of directional, horizontal, and extended reach wells.
- 3. Design drillstring and casing configurations for optimal performance.
- 4. Evaluate design considerations and operational aspects of directional and horizontal drilling.
- 5. Analyse error modeling and anticollision models relevant to drilling operations.
- 6. Identify the problems encountered during the drilling and completion of horizontal wells.
- 7. Examine materials related to current technologies, such as automation, using real-world examples.
- 8. Apply analytical and quantitative methods necessary for effective horizontal and extended reach drilling engineering.

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 designed for drilling engineers, well operations personnel, rig supervisors, drilling supervisors, and pipe manufacturers who seek to deepen their understanding of directional well designs and their applications in drilling high-angle wells.

Course Content

- I. Introduction
 - Basics



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• Review of fundamentals

2. Types of Horizontal Wells

- Planning Horizontal and extended Wells
- Optimum Placement
- Horizontal and extended Drilling Methods
- Catenary Design

3. Wellpath Planning

- Horizontal and extended Well Profile Design Methods
- Build Rate Uncertainty

4. Surveying and Calculation of Horizontal and extended Wellpath

- Well Trajectory Coordinates
- Minimum Curvature Method
- Numerical Integration Method
- Wellpath Error Analysis
- Well Separation
- Uncertainty Analysis
- Ranging Factor

5. Multilateral Wells

- Classification
- Applications
- Economics
- Rate of Return and Payout
- Risk Analysis
- Cost Per Foot

6. New Generation Horizontal and extended Wells

- Complex Wells
- Designer Wells
- Well Twining
- Snake Wells
- Fish-Hook wells
- Well Nudging
- Microholes

7. Downhole Tools and Measurements

- MWD/LWD/PWD tools
- Geo-Steering
- Rotary Steerable Tools
- Through Bit Logging
- Hands-on exercise

8. Managing Horizontal and extended Wellbore

- TVD Control, Sag Correction
- Well profile Energy and Tortuosity
- Torque and Drag, Buckling



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- $\circ~$ Wear and Wellbore heating
- Hole Cleaning
- 9. Problems
 - Well Control
 - $\circ~$ Casing Wear
 - Cementing

10. Casing wear

- Wear Estimation Models
- Specific Energy Model
- Linear Wear Efficiency Model
- Non-linear Wear Efficiency Model
- $\circ~$ Hertzian Wear Efficiency Model
- Impact Wear Efficiency Model
- Wellbore Energy Model
- Casing Wear in Horizontal and extended
- Casing Wear Grove Depth
- Casing Wear Location
- Casing Wear Factor Inversion
- Casing Strength Degradtion
- Collapse Safety Factor
- Hands-on exercise

11. Completions

- Selection of the Pay Zone
- Completion Types
- Smart Well Completion Design
- Formation Considerations
- Tools for Horizontal and extended Wells
- Challenges
- Perforation
- Stimulation of Horizontal and extended wells
- Hands-on exercise