

Advanced BHA Design and Drilling Performance Training Course

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Overview

Advanced BHA Design and Drilling Performance Training Course is a one-week course for drilling and directional functions who leave with a BHA Design and Drilling Performance Assurance File. Participants apply bottom-hole assembly design, drillstring mechanics, directional response analysis, drilling dysfunction diagnosis, and performance assurance to well-section constraints. The course connects component choices with loads, steering behavior, hole quality, reliability, and operational evidence. Agile Leaders Training Center presents BHA design and drilling performance.

Who Should Attend

- Drilling engineering functions responsible for well-section planning, operating envelopes, and assembly approval
- Directional drilling functions responsible for steering response, trajectory delivery, and tool configuration
- Drillstring engineering functions responsible for loads, stiffness, connections, fatigue, and mechanical limits
- MWD and LWD functions responsible for measurement placement, data quality, and downhole diagnostics
- Drilling supervision functions responsible for execution monitoring, dysfunction response, and post-run review
- Technical assurance functions responsible for design challenge, evidence traceability, and reliability decisions

The course assumes participants can interpret drilling plans and operational data, and it leaves out introductory drilling technology, drilling fluids design, casing design, well control, coiled tubing, and general safety management.

Departments and Industries

The course supports departments and industries that design, operate, or assure complex drilling assemblies.

- Oil and gas drilling, well engineering, and directional services
- Geothermal well construction and subsurface energy projects
- Drilling tools, MWD, LWD, and rotary steerable technology services
- Technical assurance, performance engineering, and reliability
- Research, testing, and drilling equipment development

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Learning Objectives

By the end of this course, participants will be able to:

- Build BHA requirements from well-section objectives and constraints
- Compare bit, stabilizer, motor, and rotary steerable configurations
- Analyze torque, drag, buckling, connection, and fatigue limits
- Diagnose vibration, steering, hole-cleaning, and hole-quality dysfunctions
- Use monitoring evidence to prioritize operational responses
- Evaluate post-run performance and prepare design assurance records

Course Agenda

Day 1: Define BHA Design Inputs

- Well-Section Objective and Constraint Sheet
- Bit and BHA Interaction Selection Matrix
- BHA Component Function and Compatibility Register
- Drill Collar and Heavyweight Drill Pipe Stiffness Calculation
- Connection, Outside-Diameter, and Tool Compatibility Checklist

Day 2: Design Directional Response

- Slick, Pendulum, and Packed Assembly Comparison
- Stabilizer Placement and Gauge Design Method
- Motor Bend and Adjustable Kick-Off Response Model
- Rotary Steerable System Selection Matrix
- Build, Hold, and Drop Tendency Prediction Sheet

Day 3: Analyze Mechanics and Dysfunctions

- Torque-and-Drag Input and Friction Calibration Model
- Neutral-Point and Buckling Limit Calculation
- Tension, Torsion, Connection, and Fatigue Envelope
- Stick-Slip, Whirl, and Axial Vibration Diagnostic Tree
- Hydraulics and Hole-Cleaning Interface Review

Day 4: Assure Operations and Reliability

- MWD, LWD, Jar, and Tool Placement Diagram
- BHA Failure Mode and Reliability Register
- Real-Time Drilling Parameter Threshold Board
- Dysfunction Response and Contingency BHA Plan
- Post-Run Tool Evidence and Performance Review

Day 5: Practice BHA Design Assurance

- Suggested Exercise: Audit Well-Section Design Inputs
- Suggested Exercise: Compare Motor and Rotary Steerable Assemblies
- Suggested Exercise: Diagnose Mechanical and Vibration Evidence
- Suggested Exercise: Challenge Reliability and Monitoring Controls
- Capstone Exercise: Complete the BHA Design and Drilling Performance Assurance File

Practical Exercises

The course uses suggested activities to connect assembly calculations, directional behavior, operational evidence, and assurance decisions.

- Suggested activity: convert a directional well section into traceable BHA requirements and component constraints.
- Suggested activity: compare stabilizer, motor, and rotary steerable configurations against build tendency and hole quality.
- Suggested activity: diagnose torque, drag, buckling, vibration, and hole-cleaning evidence from a drilling case.
- Suggested activity: review post-run evidence and recommend the next assembly with documented assumptions.

FAQs

Who suits advanced BHA design and drilling performance training, and what does it assume?

Advanced BHA design training suits drilling engineers, directional specialists, well planners, drillstring functions, supervisors, MWD and LWD personnel, and assurance reviewers. It assumes working ability with drilling plans, trajectory requirements, tool data, and operating parameters.

How does advanced BHA design differ from introductory drilling technology?

Advanced BHA design evaluates component interaction, directional response, mechanical limits, dysfunctions, reliability, and assurance evidence. Introductory drilling technology explains general rig systems, operations, terminology, and well construction at a broader foundation level.

How are stabilizers and drilling motors selected in BHA design?

Stabilizers and drilling motors are selected against hole size, inclination, planned dogleg, formation response, bit behavior, side loading, tool limits, hole quality, and expected operating parameters, with assumptions recorded for review.

What drilling dysfunctions should a BHA performance review diagnose?

A BHA performance review should diagnose stick-slip, whirl, axial vibration, excessive torque and drag, buckling, poor weight transfer, steering inconsistency, tool failures, hole-cleaning interactions, and degraded hole quality using surface, downhole, and post-run evidence.

Conclusion

Participants take back a BHA Design and Drilling Performance Assurance File linking objectives, component choices, mechanical limits, directional response, dysfunction controls, monitoring thresholds, and post-run evidence. It changes isolated tool choices into a traceable design decision. The file supports design review, execution monitoring, and continuous performance improvement.

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