

Torque and Drag Analysis for Drilling Operations Training Course

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Overview

Torque and Drag Analysis for Drilling Operations Training Course is a one-week course for drilling engineers, well planners, directional specialists, and operations teams who leave with a Torque and Drag Planning and Operations Decision Pack. Participants connect drillstring mechanics, friction and contact forces, well trajectory, load modelling, field calibration, operating limits, sensitivity analysis, and operational surveillance. Agile Leaders Training Center presents this course on torque and drag analysis for drilling operations.

Who Should Attend

- Functions responsible for well trajectory and drillstring planning
- Teams responsible for directional drilling and extended-reach feasibility
- Personnel responsible for drilling load surveillance and performance analysis
- Groups responsible for tubular selection and mechanical operating limits
- Technical assurance teams responsible for drilling risk and decision review

The course assumes participants interpret well plans, drillstring data, and drilling measurements at work; it leaves out software-specific operation and detailed hydraulics design.

Departments and Industries

The course supports departments and industries that plan, execute, assure, or advise drilling and tubular operations.

- Oil and gas drilling and well engineering departments
- Directional drilling and well planning service teams
- Rig operations and drilling performance functions
- Tubular, casing, and completion engineering groups
- Geothermal and subsurface construction projects
- Engineering consultancy and technical assurance organizations

Learning Objectives

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

- Analyze friction, contact force, and trajectory effects
- Build software-neutral torque and drag model inputs
- Calibrate model outputs against measured drilling loads
- Evaluate buckling, hookload, torque, and reach limits
- Diagnose operational changes from load surveillance
- Compare sensitivities and prioritize drilling risk controls

Course Agenda

Day 1: Frame Drillstring Load Mechanics

- Axial and Torsional Load Path Diagram
- Wellbore Contact and Normal-Force Model
- Coulomb Friction Assumption Map
- Soft-String and Stiff-String Comparison Matrix
- Torque and Drag Analysis Boundary Register

Day 2: Build the Load Model

- Survey and Well-Trajectory Input Checklist
- Drillstring Component and Property Schedule
- Buoyancy and Fluid-Effect Calculation Sheet
- Cased-Hole and Open-Hole Friction Factor Table
- Model Input Quality and Uncertainty Log

Day 3: Calibrate Operational Load Cases

- Pickup and Slack-Off Hookload Envelope
- Rotating and Sliding Torque Profile
- Off-Bottom Load Calibration Workflow
- Tripping and Backreaming Scenario Matrix
- Measured-versus-Modelled Load Diagnostic Plot

Day 4: Test Limits and Operational Decisions

- Sinusoidal and Helical Buckling Limit Chart
- Weight-Transfer and Lock-Up Assessment
- Rig and Tubular Operating Limit Overlay
- Trajectory and Friction Sensitivity Analysis
- Torque and Drag Surveillance Response Matrix

Day 5: Practice Torque and Drag Decisions

- Suggested Exercise: Validate Model Input Quality
- Suggested Exercise: Calibrate Field Friction Factors
- Suggested Exercise: Diagnose a Load Trend Deviation
- Suggested Exercise: Compare Reach and Operating Margins
- Capstone Exercise: Present a Torque and Drag Planning and Operations Decision Pack

Practical Exercises

The course uses suggested activities to turn trajectory, string, fluid, friction, and measured-load evidence into drilling decisions.

- Suggested activity: assemble a model input register and flag uncertain survey, string, hole, and fluid data.
- Suggested activity: calibrate cased-hole and open-hole friction factors against pickup, slack-off, rotating, and off-bottom measurements.
- Suggested activity: diagnose hole-condition changes using modeled-versus-measured hookload and torque trends.
- Suggested activity: compare trajectory, friction, string, buckling, reach, and rig-limit sensitivities before selecting risk controls.

FAQs

Who suits torque and drag analysis for drilling operations training, and what does it assume?

Well planning, drilling, directional, performance, tubular, and technical assurance functions suit the training. It assumes experience interpreting well plans, drillstring data, and drilling measurements.

How does torque and drag analysis training differ from general drillstring design training?

Torque and drag analysis concentrates on friction, contact, trajectory, load modelling, calibration, buckling, limits, and operational surveillance. General drillstring design also addresses component selection, strength, fatigue, connections, and broader assembly design.

How are torque and drag models calibrated during drilling operations?

Models are calibrated by checking input quality, comparing calculated and measured pickup, slack-off, rotating, hookload, and torque values, separating cased-hole and open-hole effects, adjusting supported assumptions, and validating the result against additional measurements.

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What causes torque and drag to increase in directional wells?

Torque and drag increase with trajectory curvature, inclination, contact force, friction, tortuosity, hole condition, cuttings accumulation, string configuration, fluid effects, and operating mode. The evidence must be tested together before a cause is assigned.

How should torque and drag operating limits support drilling decisions?

Operating limits should combine modeled loads, measured trends, buckling thresholds, tubular ratings, rig capability, uncertainty, and contingency margins so teams can compare options and escalate deviations consistently.

Conclusion

Participants take a Torque and Drag Planning and Operations Decision Pack back to their organization. It connects model inputs, calibration evidence, load envelopes, buckling limits, sensitivities, surveillance, and response choices. Teams can use the pack to document assumptions, test operating margins, identify deviations, and communicate drilling recommendations.

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