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COURSE BROCHURE

Advanced HPHT Well Design and Drilling Operations Training Course

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Registered in the United Kingdom and Saudi Arabia

Advanced HPHT Well Design and Drilling Operations Training Course

HPHT Well Design and Drilling Operations is a 2-week advanced training course for drilling engineers, drilling supervisors and well planners that ends with an HPHT Well Basis of Design for one high pressure, high temperature prospect. Operators are drilling deeper and hotter to reach gas and condensate, where narrow pressure windows and thermal loads leave little room for error. Jupiter Prime Training treats HPHT well design and drilling operations as one chain from pore pressure model to final casing point.

Why HPHT Well Design and Drilling Operations Matters Now

Three forces shape high pressure, high temperature drilling today: deep gas developments that push wells beyond conventional ratings, tighter scrutiny from partners and insurers after well control events, and an experienced workforce retiring faster than it can be replaced. An operator that predicts pore pressure accurately, manages the drilling margin in real time and rates every barrier for temperature can deliver these wells safely. One that borrows conventional practice risks kicks, losses, stuck pipe and failed seals. The course rests on established pore pressure prediction methods, casing load analysis with thermal effects and the two-barrier well integrity principle.

Who Gains Most from HPHT Well Design and Drilling Operations

- Engineers who build pore pressure and fracture gradient models for well plans
- Designers responsible for casing, cement and wellhead selection under thermal load
- Rig-site leads who run kick drills, flow checks and narrow-margin procedures
- Fluids specialists who formulate and monitor high-density, high-temperature muds
- Well integrity leads who verify barrier ratings and equipment qualification

Well delivery teams that send planners and rig-site supervisors together gain most, because design assumptions and operational limits are then agreed before the well is spudded.

HPHT Well Design and Drilling Operations Capabilities

Participants move from offset data and seismic velocities to a drillable well whose every barrier is rated for the pressures and temperatures it will meet.

- Build pore pressure and fracture gradient profiles from offset and seismic data — casing seat selection
- Calculate the drilling margin and equivalent circulating density limits — mud weight decisions
- Design casing strings for thermal, collapse and annular pressure build-up loads — tubular procurement
- Specify HPHT drilling fluids with stable rheology and density — fluids contractor scopes
- Apply kick detection and well control methods for HPHT conditions — rig-site supervision

- Assess equipment ratings for wellheads, BOPs and elastomers — well integrity approval

Key HPHT Well Design and Drilling Operations Terms

- HPHT well — A well where expected bottomhole pressure and temperature exceed the ratings and practices used for conventional wells.
- Drilling margin — The difference between pore pressure and fracture gradient that limits the usable mud weight window.
- Equivalent circulating density ECD — The effective mud density at depth while circulating, combining static mud weight and annular friction.
- Annular pressure build-up APB — Pressure rise in sealed casing annuli caused by fluid heating during production or circulation.
- Ballooning — Mud loss while pumping and return when pumps stop, often mistaken for a kick in narrow-margin wells.
- Temperature derating — Reduction in the strength or rating of steel and elastomers as temperature increases.

HPHT Well Design and Drilling Operations Day by Day

Day 1: The HPHT Challenge

- HPHT Classification Bands and Thresholds — Well Category Assignment
- Lessons from HPHT Well Control Incidents — Design Priorities
- Deep Gas and Condensate Reservoir Settings — Exploration Targets
- Well Delivery Organisation for HPHT — Roles and Approvals
- Offset Well Data Gathering — Planning Data Gaps

Day 2: Pore Pressure Prediction

- Overpressure Mechanisms and Compaction Disequilibrium — Pressure Origin
- Eaton and Bowers Methods from Seismic Velocities — Pre-Drill Estimates
- Log-Based Pressure Indicators While Drilling — Real-Time Updates
- Pressure Ramps and Transition Zones — Casing Point Risk
- Uncertainty Ranges in Pressure Models — Contingency String Planning

Day 3: Fracture Gradient and Drilling Margin

- Leak-Off and Formation Integrity Tests — Fracture Gradient Calibration
- Stress Models for Fracture Gradient — Window Prediction
- Drilling Margin Definition and Kick Tolerance — Section Length Limits
- ECD Modelling and Hydraulics Optimisation — Pump Rate Limits
- Managed Pressure Drilling Options — Margin Extension

Day 4: Casing Design Under Thermal Loads

- Burst, Collapse and Axial Load Cases — Design Factor Checks
- Temperature Derating of Tubular Steel — Grade Selection
- Annular Pressure Build-Up Mitigation — Rupture Discs and Foam Spacers
- Sour Service and Corrosion Resistant Alloys — Material Choice
- Connection Selection for HPHT Strings — Seal Integrity

Day 5: Cementing HPHT Wells

- High-Temperature Cement Slurry Design — Strength Retrogression Control
- Gas Migration Prevention During Setting — Annular Seal Quality
- Cement Placement in Narrow Margins — Loss Avoidance
- Cement Sheath Integrity Under Thermal Cycling — Long-Term Barriers
- Cement Evaluation Logs — Barrier Verification

Day 6: HPHT Drilling Fluids

- Water-Based Versus Oil-Based Systems at Temperature — Fluid Selection
- Weighting Agents and Barite Sag — Density Stability
- Rheology Under Pressure and Temperature — Hydraulics Accuracy
- Gas Solubility in Oil-Based Mud — Hidden Kick Risk
- Mud Cooling and Surface Handling — Rig Safety

Day 7: Kick Detection and Well Control

- Kick Indicators and Flow Check Procedures — Early Detection
- Ballooning Versus Influx Diagnosis — Correct Response
- Wait-and-Weight and Driller's Methods in HPHT — Kill Method Choice
- Bullheading and Volumetric Methods — Gas at Surface Handling
- Well Control Drills and Crew Readiness — Shift Competence

Day 8: Equipment Ratings and Barriers

- Wellhead and BOP Pressure and Temperature Ratings — Equipment Selection
- Elastomer and Seal Qualification — Failure Prevention
- Two-Barrier Philosophy for HPHT — Barrier Diagrams
- Choke Manifold and Mud-Gas Separator Sizing — Surface Capacity
- Downhole Tools Temperature Limits — Logging and MWD Choices

Day 9: Operations Planning and Risk

- Drilling Programme Hold Points — Section Go Decisions
- Tripping Practices and Swab-Surge Control — Pressure Fluctuation Limits
- Real-Time Operations Centre Monitoring — Trend Escalation
- HPHT Risk Registers and Bow-Tie Diagrams — Control Assurance
- Contingency Plans for Losses and Stuck Pipe — Response Readiness

Day 10: Practising the HPHT Well Basis of Design

- Pressure and Fracture Profiles for a Case Well — Applying Prediction Methods
- Casing Scheme and Load Cases — Applying Thermal Design Checks
- Fluids, Cement and Barrier Selection — Applying Rating Criteria
- Well Control and Kick Tolerance Plan — Applying Detection Procedures
- HPHT Well Basis of Design — Design Summary for Peer Review

Applying HPHT Well Design and Drilling Operations After the Course

- Recalculate kick tolerance and drilling margin for each section of an upcoming deep well using the latest pore pressure and fracture data.
- Check every pressure-containing component on the current HPHT equipment list against its temperature-derated rating and record any gaps.

HPHT Well Design and Drilling Operations Questions FAQ

What is HPHT well design and drilling operations, and why does it matter now?

It is the planning and execution of wells whose pressures and temperatures exceed conventional limits. It matters now because deep gas projects push more wells into this range, where narrow margins and thermal loads make conventional practice unsafe.

Which roles gain most from HPHT well design and drilling operations skills?

Drilling engineers, drilling supervisors and well planners gain most. Fluids specialists and well integrity leads also benefit, because mud, cement and barrier choices must match the same pressure and temperature design basis.

How does an HPHT well design and drilling operations course differ from a general drilling engineering course?

It focuses on wells at the edge of equipment ratings. You work on narrow-margin pressure management, thermal casing loads, temperature derating and HPHT well control, while a general course covers conventional well design and routine drilling practice.

What do you bring back from HPHT well design and drilling operations training?

You bring back a basis of design for a case HPHT well. It covers pressure profiles, casing scheme, fluids, cement, barriers and a well control plan, ready for peer review.

HPHT Well Design and Drilling Operations: The Way Forward

The HPHT Well Basis of Design gives drilling teams one document tying pressure prediction to casing, fluids, cement and barriers. Its first use is usually the casing scheme decision, read by well planners, supervisors and integrity leads. Revisit it after each section is drilled, because real-time pressure data often shifts the margin and the next casing point.