Advanced HPHT Well Design and Drilling Operations Training Course

23 - 27 Nov 2026

Boston

7500 € (Per Person)

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Course Introduction / Overview:

The global demand for energy continues to push the oil and gas industry into increasingly challenging frontiers, with High-Pressure High-Temperature (HPHT) reservoirs representing a significant but complex resource. This training course provides a comprehensive exploration of the specialized engineering principles and operational practices required to safely and efficiently drill wells in these extreme environments. Participants will delve into the unique geomechanical, thermodynamic, and chemical challenges posed by HPHT conditions. The curriculum is structured to build a deep understanding, from initial well design to final completion, drawing on established industry knowledge and modern innovations. As discussed in seminal works like "Advanced Drilling and Well Technology" by Bernt S. Aadnoy and Iain Cooper, success in HPHT drilling hinges on an integrated approach to wellbore stability, fluid dynamics, and material science. BIG BEN Training Center has designed this program to bridge the gap between theoretical knowledge and practical application, equipping professionals with the critical skills needed to manage the narrow operational windows and heightened risks associated with HPHT projects, ensuring both safety and economic viability.

Target Audience / This training course is suitable for:

- Drilling Engineers.
- Well Engineers.
- Completion Engineers.
- Drilling Supervisors and Superintendents.
- Rig Managers.
- Petroleum Engineers.
- Subsurface Geologists and Geoscientists.
- Well Integrity Engineers.
- Drilling Operations Managers.
- HSE Advisors involved in drilling operations.

Target Sectors and Industries:

- Oil and Gas Exploration and Production (E&P) Companies.
- Drilling Contractor Companies.
- Integrated Oilfield Service Providers.
- Engineering, Procurement, and Construction (EPC) Contractors.
- Specialized Engineering and Technical Consultancies.
- Governmental Regulatory Bodies and National Oil Companies.
- Technology and Equipment Manufacturing Companies for the energy sector.

Target Organizations Departments:

- Drilling and Wells Department.
- Operations and Production Department.
- Subsurface and Reservoir Engineering Teams.
- Health, Safety, and Environment (HSE) Department.
- Well Integrity and Asset Management Teams.
- Project Management and Engineering Departments.
- Contracts and Procurement for drilling services.
- Research and Development in drilling technology.

Course Offerings:

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

- Analyze the unique geomechanical and thermodynamic properties of HPHT reservoirs.
- Develop robust pore pressure and fracture gradient prediction models for well planning.
- Design stable wellbores and effective casing programs tailored for HPHT conditions.
- Select and manage specialized drilling fluids and cementing systems for extreme temperatures.
- Implement advanced well control techniques, including Managed Pressure Drilling (MPD).
- Evaluate material selection criteria for downhole equipment and surface systems.
- Identify and mitigate operational risks associated with HPHT drilling.
- Develop comprehensive contingency plans for potential well control and equipment issues.
- Understand the fundamentals of HPHT well testing and completion design.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive and participant-centered, fostering a dynamic learning environment. This course moves beyond traditional lectures to incorporate a blended approach that emphasizes practical application and critical thinking. A significant portion of the training will be dedicated to analyzing real-world case studies of both successful and challenging HPHT drilling campaigns, allowing participants to learn from actual industry experiences. Interactive workshops and group-based problem-solving sessions will be used to tackle complex well design and operational scenarios, encouraging collaborative learning and knowledge sharing. The instructor will facilitate discussions on the latest technological advancements and best practices in HPHT operations. Participants will receive continuous feedback throughout the course, ensuring a solid grasp of complex concepts. The program is structured to ensure that theoretical knowledge is immediately reinforced with practical examples, equipping attendees with the confidence and competence to apply their new skills directly to their professional roles upon completion.

Course Agenda (Course Units):

Unit One: Introduction to HPHT Environments and Challenges

- Defining HPHT conditions and classifications.
- Geological and thermodynamic characteristics of HPHT reservoirs.
- Key drilling challenges: narrow pressure windows and high temperatures.
- Historical overview of HPHT drilling incidents and lessons learned.
- Introduction to HPHT risk assessment and management frameworks.
- The role of geomechanics in HPHT well planning.
- Regulatory considerations and industry standards for HPHT operations.

Unit Two: HPHT Well Planning and Borehole Stability

- Advanced pore pressure and fracture gradient prediction techniques.
- Wellbore stability analysis in HPHT environments.
- Casing seat selection and well trajectory design considerations.
- Integrated well design and its impact on drilling performance.
- Material selection for casing and tubulars under HPHT stress.
- Thermal expansion effects on casing and wellhead design.
- Introduction to torque and drag modeling for complex HPHT wells.

Unit Three: HPHT Drilling Fluids and Cementing Technology

- Requirements and properties of HPHT drilling fluid systems.
- Managing fluid rheology, density, and ECD at high temperatures.
- Advanced solids control equipment and strategies for HPHT fluids.
- Chemistry of HPHT cement slurries and additives.
- Best practices for HPHT primary cementing operations.
- Zonal isolation challenges and remedial cementing techniques.
- Gas migration control in HPHT cementing.

Unit Four: Well Control and Drilling Equipment for HPHT Operations

- Advanced kick detection methods in HPHT wells.
- Principles and application of Managed Pressure Drilling (MPD).
- HPHT well control procedures and calculations.
- BOP stack requirements and testing for HPHT service.
- Design and limitations of downhole tools (MWD/LWD, motors).
- Wellhead systems and elastomer selection for HPHT environments.
- Drill string design considerations for HPHT applications.

Unit Five: HPHT Drilling Operations, Completion, and Risk Management

- Tripping practices and surge/swab pressure management.
- Stuck pipe prevention and mitigation strategies in HPHT wells.
- Lost circulation diagnosis and treatment in depleted HPHT zones.
- Contingency planning for equipment failure and well control events.
- Introduction to HPHT well completion design and technology.
- Well testing procedures and safety in HPHT environments.
- Comprehensive project risk management and review of the drilling program.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the increasing environmental scrutiny and the inherent risks, how can the industry balance the economic necessity of exploiting HPHT reservoirs with the imperative of long-term well integrity and environmental safety?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by adopting a holistic, integrated approach to HPHT drilling that extends beyond mere engineering calculations. While many programs focus narrowly on specific technical aspects, this training emphasizes the critical interplay between geomechanics, fluid science, material engineering, and operational risk management. It is built upon a foundation of contemporary, real-world case studies, providing participants with invaluable insights into both industry successes and failures, which fosters a deeper, more practical understanding of decision-making under pressure. The curriculum is designed not just to teach procedures, but to cultivate a mindset of proactive risk identification and mitigation essential for high-stakes environments. Furthermore, the course content is dynamically updated to reflect the latest technological advancements, such as Managed Pressure Drilling (MPD) applications and advanced material sciences, ensuring participants are exposed to the most current and effective industry practices. The focus remains steadfastly on practical application, empowering attendees to translate complex theoretical knowledge into tangible, safe, and efficient operational strategies in their own projects.