

HPHT Drilling Design & Operations

5 days
Overview

HPHT-EN-P

LEVEL

Expert

PURPOSE

This course aims to provide a comprehensive knowledge on how to design and execute an HPHT well in an exploration or development context.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:
understand the design concepts related to an HPHT well,
learn about required operational preparedness aspects of HPHT drilling operations,
assimilate the key aspects for executing successful operations in HPHT drilling.

WAYS AND MEANS

Presentations.
Exercises.
Application to real cases.

LEARNING ASSESSMENT

Exercises, quiz, written exam.

PREREQUISITES

Comprehension and understanding of well design, well construction operations, and management.
To be familiar with and understand basic geomechanics, drilling operations, well placement, well planning, and drilling fluids basics.
Understanding of well control concepts and procedures is a plus.

Agenda

GENERALITIES

Applications, terms and definitions.
PPFG aspects of HPHT reservoirs (effect of depletion, geomechanics).
Well architecture specificities of HPHT wells.

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BASIC DESIGN ENGINEERING

Casing design specific to HPHT (thermal simulations/introduction to limit-state and reliability based design/survival loads).
OCTG choice (material grade, SSC, qualification).
OCTG connector choice (test and qualification).
Well equipment (liner, wellheads, casing hangers...).
Annulus management systems (N₂ cushion, burst discs, crushable foams...).
Subsea HPHT specificities (wellhead fatigue, X-Mas tree choice, APB).

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ADVANCED HPHT WELL ENGINEERING

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Casing wear (modeling, measurement, remedial).
Wellhead growth (modeling and impacts, heat island effect).
Fluids & cement aspects of HT environments.
Kick tolerance modeling (dispersed modeling w/drill bench or equivalent, limitations of single bubble in HPHT).
Hydraulic modeling in HPHT operations.
Logging (current HT limitations on MWD tooling).
Introduction to MPD.
In-field drilling (depletion and stress caging...).

OPERATIONAL PREPARATION

4.5

Rig inspection program for HPHT operations.
Equipment specific to HPHT (mud coolers, kick assembly, early-kick-detection...).
Hydrates (formation mechanisms, prevention).
HPHT checklists.
HPHT procedures (pit management and discipline, breaking circulation, connections, flow checks, tripping procedures, pump out of hole).
HPHT coring and wireline logging.

OPERATIONAL EXECUTION

7.5

ECD management.
Wellbore breathing (breathing vs. kick, loss-gain scenarios, supercharging mechanisms, fracture...).
Well control aspects.
(E)LOT/FIT in HPHT.
Mud weight management.
Fingerprinting (dummy) connections, swab & surge, compressibility test, drain back/flow volume...).
Case studies (HPHT train wrecks, database analysis of exploration and development wells).