Formation - New technologies: completion, HPHT and MPD

FORNTEC-EN-P | Présentiel | 5 jours

To provide some knowledge related to well complex completion, MPD and HPHT operations

Niveau

Perfectionnement

Public

Drilling/completion/fluid engineers, supervisors involved in drilling and completion operations

Objectifs

Attendees will be able to implement the following skills:

- Work on complex completion issues
- Design the corresponding completion procedure
- Understand use of MPD and why (equipment and technique)
- Understand specificities and associated measures of HPHT wells

Pédagogie & ressources techniques

- Some equipment and cutaway tools display available at IFP
- Summary notes prepared and presented by participants
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course

Évaluation des acquis

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners’ understanding and assimilation of the knowledge linked to the training objectives

Prérequis

No prerequisites are necessary to follow this course

Responsable

IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Programme

ADVANCED COMPLETION — 1 day

Subsea smart completion: objectives, technology description and implantation.
Multilateral completion.
Single trip multizone gravel pack system: introduction, dual string and single string, BJ & Halliburton comparison, offshore wells operation BJ MST system key components.
Tubingless completion: objectives, tubingless well architecture and equipment innovation.

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Would it make sense to add a word about WABs? Cementless expandable lower completion?

HPHPT WELLS — 1.5 days

HPHPT definitions:

- API.
- Other standards.
- TotalEnergie.
- PP/FP profiles: narrow mud windows notion, reservoirs (geomechanics and effect of depletion), pressure transition zone (PTZ).

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...).
- Subsea HPHT specificities (wellhead fatigue, X-Mas tree choice, introduction to APB).
- Annulus management systems (N2 cushion, burst discs, crushable foams...).
- Well architecture specificities of HPHT well. Real case presentation.

Advanced HPHT well engineering:

- Casing wear (modeling, measurement, remedial).
- Wellhead growth (modeling and impacts, heat island effect).
- Fluids and cement aspects of HT environments (mud weight reference at 50°C).
- 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).
- Infill drilling.

Operational preparation

- Rig inspection program for HPHT operations.
- Importance of bridging document/JDM between contractor and operator.
- Equipment specific to HPHT (mud coolers, kick assembly, dart sub, MPD...).
- Hydrates (formation mechanisms, prevention).
- HPHT checklists (example supplied).
- HPHT procedures (pit management and discipline, breaking circulation, connections, Horner plot flow checks, tripping procedures, pump out of hole or stripping if MPD).

Operational execution

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

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MANAGED PRESSURE DRILLING — 2 days

Introduction:

- Definition (IADC), history and objectives.
- Why using MPD?
- Surface back pressure (SBP) introduction.

Main components and layout:

- Rotating control device (RCD).
- Choke manifold including Coriolis mass flow meter (example of real layout).
- Drill pipe non return valves.

MPD operations with RCD:

- Drilling: difficulties to differentiate “well breathing-supercharge” and an “influx”; management of the surface back-pressure (manual, SBP mode, APC mode, “C” mode); use of PWD; kick detection (EKD, virtual trip tank); limitations and risks, well control matrix.
- Tripping/stripping: POOH (adjusting SBP); temperature effect mud weight (static and dynamic temperatures), mitigation; mud cap, why and when, risks and limits; RIH; procedure example.
- Dynamic fit/lot: principles, dynamic FIT with PWD, dynamic LOT with PWD and Coriolis flow meter, real time SBP setting.
- Dynamic pore pressure (pp) assessment: principle, SBP and AFL, MW adjustment for drilling and tripping/stripping.
- Casing RIH and cementing: case study.

Conclusion:

- Advantages of MPD.
- Risks and limitations.

KNOWLEDGE ASSESSMENT — 0.5 day

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