



ABERDEEN DRILLING INTERNATIONAL

HPHT Drilling Operations

OVERVIEW

This HPHT Drilling course provides a comprehensive understanding of the well design and operational requirements for HPHT wells. It develops the principles of HPHT well engineering from rig selection through well control and HPHT considerations for casing design, drilling fluids and cement formulations. The course draws on case studies for classroom discussions.

DESIGNED FOR

This course has been designed for drilling personnel, well planners, and senior drill crew. No prior HPHT experience is assumed.

COURSE DELIVERY

This course is delivered over 3 days and is taught through presentation of a series of interactive lectures, case studies, group discussion, and drilling simulation exercises.

CERTIFICATION

Successful completion of the course will result in an Aberdeen Drilling School certificate which is valid for 2 years.

ENTRY REQUIREMENTS

There are no formal pre-requisites for this type of training; however, candidate suitability and assumed base knowledge will be discussed and agreed with the client in the early stages of course development.

LEARNING OBJECTIVES

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

- List and explain the differences in well design between HPHT and conventional wells.
- Apply the knowledge of HPHT well design and considerations in the selection of the rig and equipment to optimise well performance.
- Explain and describe the challenges of well control in HPHT environments from pressure prediction, detection and well control procedures.
- Describe what is meant by fingerprinting and develop rig procedures to use fingerprinting effectively.
- Describe the effects of HPHT on casing and fluids design.
- Support the need for training and communication as a key factor of success in the safe delivery of HPHT well operations.

INDICATIVE COURSE CONTENT

The course covers the following modules:

Characteristics of HPHT wells – The course begins by looking at the industry definition of an HPHT well and examines the characteristic that make HPHT wells challenging. A review of why HPHT wells fail is considered in order to focus attention on the key differences between HPHT and conventional wells.



Teamwork and communications – In many aspects of well engineering and operations teamwork and communications between team members is critical to optimise performance and ensure safe operations. HPHT is no different and given the nature of the low margins associated with HPHT operations teamwork and communications makes the difference in delivering the project safely.

Rig and equipment selection – A detailed review of the essential requirements of the rig and drilling equipment is provided covering the rig, fluids control equipment and well control equipment and instrumentation.

Well control – A comprehensive examination of pore pressure prediction is provided, including the geological origin of abnormal pressure, and an explanation for narrow pressure margins between pore and fracture pressure. The causes of kicks and kick detection and detailed operating procedures are described and explained, including driller's method, wait and weight, volumetric method, bullheading, stripping and snubbing. Ballooning, breathing and supercharging will be explained.

Fingerprinting – Monitoring drilling trends and reacting to changes in trends in a timely and appropriate manner are key operational practices in HPHT wells. Consideration will be given to the data collected and the corresponding decisions and actions that need to be taken.

Bottom hole pressure – The effect of temperature and pressure on drilling fluid density and the importance of ECD management and use of PWD is explained. The importance of operational procedures to minimise surge and swab effects is emphasised. Kick tolerance and gas behaviour is discussed in terms of the effects of temperature. The importance of monitoring gas while drilling is explained.

Underground flows – Given the narrow margin between formation pressure and fracture pressure in HPHT wells the situation may arise where there are simultaneous influx and losses leading to underground flows. The causes and treatments for underground flows are described and explained.

Casing design in HPHT wells – This section reviews the effects of temperature on casing design criteria such as load and yield strength changes. The particular importance of casing wear and the effect on casing design and well integrity are considered.

Drilling fluids and cement – The importance of drilling fluid selection and HPHT testing is explained and aspects of drilling fluid design, rheology and additives discussed. Similarly, the effects of temperature on cement formulation and practices are reviewed in light of HPHT downhole conditions.