HPHT TROUBLESHOOTING
Course Overview

HPHT Drilling, Completion, Intervention and Workover Operations are amongst the most expensive rig-based operations in the world. And as seen from a fairly recent North Sea HPHT Well Integrity Incident trouble-shooting goes a long way to determine cause, effect and subsequent cost of repair. There are also the associated costs of lost production whilst adjacent wells to a failed well are shut-in which clearly suggests an in-place early trouble-shooting program to be a necessity rather than an ideal.

The course takes delegates through HPHT well planning, design, well construction, well production and well integrity so that “trouble-shooting” can be achieved at the first sign of problems. The information given during the course can be cross-referenced to help the assessor as to what may be happening if there’s a problem on his well / platform and what the solution might / should be.

Delegates will leave the course understanding:

- The key differences between HPHT and standard wells;
- The problems associated with High Pressures & High Temperatures;
- The importance of choosing the right rig and crew for the job;
- Why – and how – HPHT wells are designed as they are and the things to look out for during well design and well construction;
- The HPHT tools / systems and materials used to drill these wells e.g. directional tools, MPD, cementing, drilling fluids etc.;
- The importance of appropriately tested well barriers; engineering systems, operational systems and well integrity systems.

The following media are used during the course:

1) Lectures (the Trainers began their careers 35 and 39 years ago and have been involved with many HPHT wells around the world on land rigs, jack-ups, platforms and semi-submersibles);
2) PowerPoints (written by the Trainers);
3) Videos & Digital Film
4) Calculations & Manuals
5) Electronic Tablets

Aims & Objectives

The aims and objectives of the course are for delegates to understand how to determine developing problems on HPHT wells before they actually happen and the well has to be suspended or shut-in.

Provision is also made for delegates to discuss any HPHT aspect of their up-coming wells which are pertinent to their employer’s projects in order to attain success not just first time – but every time.

Who Should Attend

Drilling Engineers, Senior Drilling Engineers, Offshore Drilling Engineers, Drilling Supervisors,
Drilling Superintendents, Drillers, Toolpushers, Service Personnel
Michael Gibson (PhD)

Overview

- Seasoned professional with 35 years’ worldwide experience on drill-ships, semi-submersibles, tender-assist units, platforms, jack-ups and land rigs.
- Extensive experience both onshore and offshore in engineering and operations for Operators and Drilling Contractors on exploration, appraisal & development wells.
- Extensive risk assessment, advisory, planning and rig-site work experience ranging from Drilling Engineer through to Drilling Supervisor, Superintendent & Drilling Manager.

Training

Training experience worldwide ranges across Operators, Drilling Contractors and Service Companies both in-house and public in the following areas:

- HPHT
- Stuck Pipe Prevention & Fishing
- Deepwater Well Engineering
- Deepwater Operations
- Directional Drilling
- Horizontal & Multilateral Wells
- Accelerated Drilling Programmes for Drilling Contractors
- Graduate Drilling Engineering for Operators
- Optimised Drilling Practices
- Well Planning & Engineering
- Well Construction
- Well Control (Advanced, Understanding, Deepwater & HPHT)

Consultancy

Engineering & Operations Advisor to Operators, Drilling Contractors, Banks & Insurance Companies worldwide re Drilling & Field Development, Risk & Blowouts

- Hazard Analysis
- Offshore Operations
- Technical Advisor for HPHT Developments
- Well Control
- Technical Advisor for Deepwater Operations

Project

- Project Manager for HPHT Field Development; Standard Field Development
- Production Optimisation
- Risk Mitigation
- Brownfield Re-development
- Deepwater
- Well Control
- Management Systems

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INTRODUCTION

During this introductory section we will introduce the value of Troubleshooting in HPHT wells, which are among the highest cost wells to drill and complete in the industry. Delegates will also be given the opportunity to specify which subject areas are of the greatest interest to themselves and their companies.

The Elgin HPHT Field in the U.K.’s North Sea, one of the first HPHT fields to be developed in the U.K. in the mid-1990’s, will be referenced during the course.

HPHT OVERVIEWS

During this section we will cover the following subject areas in overview format, through discussion and PowerPoint:

- Definitions per Industry Practice
- The absolute importance of well integrity
- The Transition Zone
- Teamwork
- Objectives of HPHT procedures
- Learning from the past
- The increased risk of well control events
- Operating Margins
- Documentation & Training
- Getting Ready: Training & Drills;
- The Importance of Clear Communication

HPHT WELL PLANNING

There are many factors to consider both prior to and during the well planning process. Apart from the more obvious ones of pressure and temperature, there’s the transition zone to consider as well as hot returning drilling fluids, the area of well control and tripping & drilling practices. This section covers the following in introductory format with a few to showing how they have impacted Troubleshooting:

- Learning from past mistakes (a list of examples / mistakes will be discussed)
- Timelines
- What data / information is required?
- To test – or not to test exploration wells?
- Fault reactivation
- Drilling Fluids / Caesium Formate

The absolute importance of well integrity

Definitions of HPHT

- NPT = Normal Pressure Normal Temperature
- HPHT = High Pressure High Temperature
- Ultra-HPHT = Ultra High Pressure High Temperature
- HPHT-Hc = High Pressure High Temperature hors categorie

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STANDARDS FOR DRILLING & TESTING

Many Operators & Drilling Contractors have found themselves in challenging moments often because the relevant standards have not been adhered to. There are many standards, not least those written by:-

- The Energy Institute (e.g. Institute of Petroleum IP 17 Volumes 1, 2 & 3)
- IP Volume 1: HPHT Well Planning
- IP Volume 2: Well Control During the Drilling & Testing of HPHT Wells
- IP Volume 3: HPHT Well Completions & Interventions
- API American Petroleum Institute
- NACE regarding Corrosion
- DEA Drilling Engineering Association
- IADC International Association of Drilling Contractors
- Referenced formulae for Well Control: IADC WellCap & IWCF

RESERVOIR DATA

Review / “Trouble-shoot” analysis of data / past learnings shows that in many cases the quality of the reservoir data used in the well planning stage could have been higher. It is crucial to utilise “maximum possible” pore pressure during the exploration drilling phase and “minimum possible” fracture pressure. The following are those key areas which will be discussed during this section:-

- Maximum predicted pressure for drilling
- Maximum predicted pressure for production testing
- Maximum predicted temperature for drilling

High Temperatures do not only affect the BHA Components but Drilling Fluids too

- Maximum predicted temperature for production testing
- Accurate prediction of the narrow margin between pore pressure and fracture pressure
EQUIPMENT

In this section we will review those areas which have typically given the Industry problems and the key things to “Troubleshoot” if there’s seen to be a problem:-

- Choke & Kill Manifold

- BOP: Elastomers (Ref: API Spec 16a)
- BOP: Annular(s)
- BOP: Pipe Rams (including VBR, Bonnet Seals & Ram Shaft Packings)
- BOP: Variable Bore Rams
- Choke & Kill Manifold
- Bonnet Seals
- Ram Shaft Packings
- Kill Manifold
- Mud Gas Separator
- Wellhead Equipment
- Temperature Monitoring Equipment
- Panels & Instrumentation
- Casing
- Tubing
- Hydrogen Sulphide
- Corrosion
RIG SELECTION

There are many aspects to Rig Selection. This section covers key areas.

- Oceanographic
- Meteorological
- Essential Equipment
- HPHT Specific Equipment
- Third Party Equipment & Services
- Shore-based Services and Support
- Drilling / Testing History
- Personnel Competency
- Results of Audit (We will work through an HPHT Rig Audit Report which was undertaken on a semi-submersible rig offshore to Vietnam in 2014)
WELL CONTROL MANAGEMENT

Effective Well Control Management is Crucial

First class management is crucial during any kind of well control event. This section covers the follows key management areas:-

- Well Control Readiness Audit
- Blowout Prevention & Contingency Planning

Check Lists:-
- The Sub-surface Risk Environment
- The Non-technical Risk Environment
- The Well’s Design
- Equipment Specification & Inspection
- Well Operations Management
- Well Control Management
- Blowout Management
- Recovery
- Well Control Case Histories: Why they Happened
- Best Practices: Drilling
- Best Practices: Tripping – Avoiding Swab & Surge
- MPD
- Annulus Monitoring – Well Start-Up & Annulus Barriers
- Relief Well Planning & Relief Well Killing
- How Troubleshooting could have avoided Well Control Events

Q & A

This session allows the course delegates the opportunity to go into any aspect of the course or their up-coming wells or aspects where they may have had problems or issues in the past on their HPHT wells.
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Contact Details

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☐ I would like to contact IDEAS for In-House Consultancy Solutions
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