# Deepwater Drilling
## Well Design, Engineering & Operations

Kingdom DRILLING TRAINING

### Duration/Dates of Course
**4 - 5 days (Classroom format)**

### Overview
This introductory course outlines the delivery of complex deepwater drilling projects. It further explores why project management and a multidisciplinary approach is essential to a project's success. The course enables participants to develop the knowledge and skills to design, engineer and apply a practical approach to a deepwater project's drilling operations success.

### Target Participants
Persons engaged in deep-water or complex well's drilling projects; e.g., in well design, engineering, operational or organizational functions such as admin, technical, finance, QHSE, logistics, services, support, drilling, geology, geo-science, petroleum, reservoir, completions, workover, and production. Pre-requisite: 2-3 years basic to intermediate knowledge of offshore drilling.

### Purpose
- A practical and participative course that shall enable a multidisciplinary project team to develop the skills and knowledge to design, engineer and safely drill a deepwater well.

### Goals and Objectives
- Deliver the awareness required for a multidisciplinary team's skills-set to be developed to enable the practical design, engineering and safe drilling operation of a deepwater well.
- Develop the knowledge required to recognize and analyze the difficulties, challenges and opportunities that exist in deepwater drilling, design, execution and how to mitigate operations risks to as low as reasonably practicable.
- Equip participants with the required tools to evaluate, organize, plan, implement and control a deepwater well's drilling operating process from the project start to its end.

### Course Take Away
- Know the drilling differences between normal offshore and deepwater wells.
- Develop a wider skill to deliver a deepwater well's safe drilling and operational requirements.
- Enabled to label and identify key project hazards and risks presented within deepwater drilling, and have the knowledge to practice, control and mitigate the operating conditions and contingencies required.
- Develop the knowledge to adapt the technologies best suited for deepwater drilling operations.

# Course Summary
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| Session | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
|---|---|---|---|---|---|
| 08:30 to 10:15 | *Introduction Goals and Objectives* Deepwater drilling differences *Self-test quiz* | DW* Shallow Structural design *Case studies, worked examples* | DW casing and engineering design *Case studies, worked examples* | DW well integrity, control and operational management *Case studies* | DW adaptive technology opportunities *Media files, Case studies, worked examples* |
| 15 mins | | Break | | | |
| 10:30 to 12:00 | DW projects Standards, regulations, and guidelines | DW Riserless drilling *Case studies, worked examples* | Wellbore pressure and stability management *Case studies, worked examples* | Secondary control, contingency and emergency response *Case studies, worked examples* | Suspension and abandonment of wells *Case studies, worked examples Post quiz (30mins)* |
| 12:00 to 13:00 | | Lunch Break | | | |
| 13:00 to 14:30 | DW rigs, equipment, systems *Media files* | DW water subsea capital equipment | Dw drilling and cementing fluids | *Learning from Macondo (45mins video) Lessons learned discussion* | *Parking lot questions, course debrief, feedback and closeout* |
| 15 mins | | Break | | | |
| 14:45 to 16:30 | DW Geology, Geoscience hazards and challenges | Conductor, wellhead, BOP riser design *Case studies, worked examples* | DW problems, hazards, risk and change management *Group exercise* | DW well control problems Close-out *Group exercise* | |

*DW = Deepwater

# Course Details
## Well Design, Engineering & Operations

### Day 1

**Deepwater Fundamentals, Essentials**

**DW Essentials and differences:**
- Definitions, environments
- Delivering deepwater projects
- Well design, engineering and operations

*Media files 'Deepwater drilling'*

**DW Project Standards, Rules, Regulations:**
- Deepwater trends and drivers
- Project management essentials
- Control and metric principles

**DW Rigs, equipment, systems:**
- Rigs, equipment challenges and selection
- Pipe handling systems, station keeping
- Riser compensation, tensioning systems
- Subsea BOP and auxiliary equipment
- Marine systems, supply and logistics chain

*Media files supplement in this session*

**DW Geology and geoscience:**
- Deepwater geoscience environments
- Deepwater geoscience hazards
- Pressure, stability, wellbore management

*Media files supplement in this session*

**Debrief:** Review of Day 1

### Day 2

**DW Design, SSBOP, Riser and Subsea Equipment**

**Deepwater structural string design:**
- Structural string design
- Wellhead and structural string guidelines
- Worked examples and case studies

**Deepwater Riserless Drilling:**
- Riserless convention and non-convention
- Shallow hazard prediction and mitigation
- Deepwater riserless drilling, with worked examples and case studies

*Media files supplement in this session*

**DW Subsea Capital Equipment:**
- Diverters and marine risers
- Riser and associated components
- BOP and wellhead integrated design

*Media files supplement in this session*

**DW Conductor, Wellhead, SSBOP/Riser desig:**
- Drilling riser and wellhead equipment
- Riser behavior, Operating criteria
- Riser analysis, Case study examples

**Debrief:** Review of Day 2

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### Day 3

**Deepwater Well Construction, Management**

**Deepwater casing, tubular design. well integrity**
- Deepwater casing design
- Annular pressure build up and wellhead growth
  Worked examples
- Well integrity failure prevention and mitigation
  Case studies

**Deepwater Pressure and Stability Management:**
- Pressure prediction and detection
- Pressure Management in deepwater
- Wellbore stability management
  *Media files supplement in this session*

**Deepwater Drilling & Cementing:**
- Deepwater drilling fluids
  - Water based, oil based
  - Challenges
  - Solutions and application
- Deepwater cementing:
  - Challenges
  - Cementing technologies
  - Solutions and application
    *Media files supplement in this session*

**Deepwater Situational Problems Hazards, Risks:**
- Labelling deepwater drilling problems
- Problem solving, risk management and decision making. Case studies, examples
- Contingency and response management

**Debrief:** Review of Day 3

### Day 4 | 5

**DW Well Integrity, Control, Assurance**

**Well control 'level 1' assurance management:**
- Primary 'level 1 Deepwater well control'
- Standard operating procedures.
- Best practices, Competency training

**Deepwater Secondary 'level 2' well control:**
- 'Level 2' Deepwater well control
- Non-standard operating procedures
- Best practices, Competency training

**Deepwater 'level 3' well control:**
- Learning from DW well control failures
- *Macondo investigative media file*
- 'Level 3' Emergency contingency response

**Deepwater Well Control Group exercise:**
- Deepwater level 1, 2 & 3 case studies, individual and work group exercises

**Debrief:** Review of Day 4

**Day 5: Deepwater Technology, Well Abandonment**

**Deepwater Adaptive technologies:**
- What technologies are for DW?
- Review of adaptive DW technologies
- Technology applications.
- What's the future for deepwater?

**Deepwater Well Abandonment:**
- Well integrity assurance in suspension and abandonment
- Suspending deep-water wells
- Temporary abandonment
- Permanent abandonment
- Case study examples

**Debrief:** Review of Day 5

**Final course review and feedback**