Deepwater well design, construction & drilling operations

Training and development
Our Mission

- Deliver a recognized excellence in deepwater industry training, education and development through associations of industry peers enabling the transfer of leading edge and established technologies to the drilling industry and professions.
Presentation outline

- Deepwater drilling training objectives
- Deepwater challenges
- Justification
- Participation
- Course details
- Why train?
Course Objectives

I. Demonstrate a knowledge, understanding and awareness to the design, construction & delivery of deepwater wells
II. Assure “fit for purpose” process, people, tools and equipment to meet customers needs and requirements
III. Identify hazards, prevent and mitigate risks, understand drilling problems to deliver corrective solutions required.
IV. To be able to execute safe, efficient and effective offshore deepwater drilling operations
V. To be able to perform essential drilling and well engineering & control calculations
VI. Maximise participation and engagement of course attendees to deliver training & development required.
Training Objectives

- To deliver a working, technical and engineering knowledge to plan, organise implement and control the deepwater design, construction, exploration & development of Deepwater Drilling projects.
Business Challenges!

- New venture & high risk exposure to organizations?
- 1st deepwater licenses for operator, drilling contractor & service company personnel?
- Water depths > 150m → 3000 m?
- Remote and demanding environment(s)?
- New process and technology requirements?
- New skills sets for personnel required?
- New processes of planning, implementation needed?
- How to succeed first time?
Technology Risk!

- **Technical, commercial, financial**
  - Focus on > **cost/risk areas**
    - E.g. Drilling & completion
  - Prevent / mitigate key risks
    - To eliminate 80% of potential loss
  - Why train?
    - **Are People your greatest risk?**
      - E.g. Lack of knowledge, understanding, awareness?
Training Justification

- Offshore Deepwater Project Costs
  - 54% drilling & completion
  - 21% subsea facilities
  - 12% surface facilities
  - 14% contingency, engineering and project management costs

Note: Data derived from Texaco’s Deepstar JIP project.
Deepwater drilling challenges

- Water / depth
- Pressure / temperatures
- Geo-science demands
- Operating environment
- Formation characteristics and operating conditions (limits)
- Wellbore stability
- Wellbore quality
- People, multidisciplinary skill set.
- Operating Procedures, guidelines
- Loss, risk, performance management
Deepwater Drilling

- Drilling
  - Drilling fluids
  - Cementing
  - Tools and equipment
  - Procedures/guidelines
  - Directional drilling
  - MWD/LWD
  - Wireline logging
  - Coring
- Well testing
- Completions
  - Horizontal, Multilateral
  - SMART systems needed
- Other
  - Well control (losses/gains)
  - Hydrates
  - Lessons learned
  - Emergency preparedness
  - Contingency planning
  - Training & development
  - Continuity
  - Multidisciplinary approach
  - A learning organisation
  - Hazards, Risk & loss control management
Deepwater Drilling

- Environment
  - Water depth
  - Subsurface conditions
    - Marine sediments
    - Shallow gas/flows
    - Pressures, temperatures
  - Weather
  - Subsea Currents
  - Ecosystem
  - Location, operating region

- Well design
  - Rig type & selection
  - Subsurface eqpt
  - Press & temperatures
  - Subsurface hazards
  - Casing & fluids program
  - Directional drilling
  - Best Drilling Practices
  - Well suspension & abandonment
  - Design for NO intervention
Deepwater problems

- Water depth and spanning the water column
- Pore/formation strengths constraints on well construction and design
- Pressures & temperatures regimes near seabed.
- Wellbore instability. Rock and fluid interactions
- Geo-hazards (*shallow water flow, gas well control.)*
- *< kick detection, and well control management issues*
- Subsurface, sub-sea design and operational requirements
- Drilling mud, cuttings discharge, & completion fluid issues
- Operational procedures to address hazards and risks
- Specialised drilling unit equipment requirements.
- Station keeping, dynamic positioning, mooring, anchoring.
- Technological drivers and new innovations.
Course outline examples

- **Deepwater drilling operations**
  - *1 week*, focusing on offshore delivery, engineering and **processes** required to deliver deepwater drilling operations and activities.

- **Well planning and construction**
  - *1 week*, focusing on **well construction**, and **drilling engineering processes** required to prepare and plan for deepwater drilling activities, and how to measure and control operational execution.

- **Well Control management.**
  - *3 days*, focusing on **specific deepwater well control management**, equipment, procedures, contingency and emergency planning requirements.
Deepwater Drilling operations

Day 1; Management

1. Introduction to deepwater
2. Deepwater history and justification
3. Identifying and recognising deepwater hazards
4. Risk management
5. Loss control management;
6. Performance delivery.
Deepwater Drilling operations

Day 2; Equipment

1. Rig selection, design, requirements
2. Mooring, station keeping, dynamic positioning.
3. Marine riser and tubular management
4. Operating Deepwater drilling equipment
5. Subsea equipment operations
6. Wellhead & BOP systems and equipment operating requirements
Deepwater Drilling operations

Day 3; Geology, environment, open water

1. Introduction to Deepwater geology & drilling environment.
2. Essential deepwater drilling fundamentals
3. Riserless drilling.
4. Optimizing riserless drilling operations
5. Deepwater drilling fluids
6. Deepwater cementing.
Deepwater Drilling operations

Day 4; Deepwater drilling and completions

1. Deepwater operations planning.
2. Pore pressure, ECD and wellbore stability management
3. Deepwater drilling operational guidelines
4. Deepwater problem prevention
5. Development drilling, completions and well testing.
6. Suspension & abandonment,
   New and emerging technology.
Deepwater Drilling operations

Day 5; Well control, Case study.

1. Introduction to deepwater well control
3. Well control procedures
4. Case study
5. Case study
6. Case study.
Well construction/engineering

Day 1; Management

1. Introduction to deepwater well design and construction?
2. Justification, business drivers and risks.
3. Meeting management’s goals and objectives.
4. Hazard, risk management
5. Loss control management
6. Time, costs, and project planning processes.
Well construction/engineering

Day 2; Equipment

1. Rig design, well design, and drilling engineering requirements.
3. Riser/Conductor design.
4. Drilling equipment systems management, design and engineering requirements.
5. Subsea systems management and design.
6. Wellhead & bop systems management and design.
Well construction/engineering

Day 3; Well operations planning/construction

1. Deepwater geology & environment.
2. Fundamental deepwater drilling engineering.
3. Well engineering riserless drilling operations.
4. Delivering open water operations.
5. Deepwater drilling fluids programme requirements.
6. Cementing fluids programme and design.
Well construction/engineering

Day 4; Deepwater drilling and completion.

1. Deepwater well planning and drilling engineering.
2. Pore pressure and ECD prediction techniques.
3. Wellbore stability and pore pressure management.
4. Deepwater hydraulics and hole cleaning.
5. Contingency management and problem prediction.
6. Designing and engineering for deepwater Development drilling, completions, well testing and abandonment.
Well construction/engineering

Day 5; Well control, Case study.

1. Deepwater well control management;
2. Deepwater well control procedures;
3. Deepwater emergency response & Contingency planning
4. Case study
5. Case study
6. Case study.
Well Control Management*.

- Day 1; Deepwater well planning & design
- Day 2; Deepwater well control procedures
  - Shallow water (flows, gas)
  - Conventional with BOP’s installed
  - Tertiary control methods.
- Day 3; Deepwater well control equipment & systems requirements
  - Emergency and contingency response
  - Training needs and requirements

*IADC deepwater well control manual to be supplied.*
Participants, pre-requisites

- **Participants**
  - Operator, service company and/or drilling contractor personnel: managers, superintendent, engineers, foremen, supervisors, team leaders, and other interested disciplines.

- **Prerequisites**
  - Working knowledge of Mobile Offshore Drilling units. *i.e.* semi-submersibles, drillships. Offshore drilling rig-site work experience and/or onshore operations support.
  - **Note:** For weeks 2 & 3, participants must have attended deepwater drilling operations course to obtain operational understanding and awareness to issues required to be addressed.
Participants, pre-requisites

- Balanced group of attendees preferred; serving both operator, service company and drilling contractor community.
- Working together as teams, working to solve realistic offshore deepwater situations, problems and solutions.
- Participate to learn, train and develop operational, planning and construction skills to meet offshore deepwater drilling needs.
Why train?

1. To deliver more Efficient, Effective and Safer deepwater drilling operations requires; “Fit for purpose” persons, tools, equipment, and processes.

2. Training/development cannot be over emphasised as Deepwater delivery costs demand loss and trouble free operations

3. Can you afford not to train your personnel?

4. Tuition costs equating to $\leq 1\text{hrs}$ rig time?
Contact details

- For a training inquiry form please contact via web-site @ www.kingdomdrilling.co.uk
- or email directly to:
  - i.e. Kingdom_drilling@msn.com
Deepwater drilling

End of presentation