

petroEDGE



HPHT WELL ENGINEERING

19 – 23 March 2012 Kuala Lumpur, Malaysia



**In association with
Aberdeen Drilling Schools International**

**Course Director: DR. J. AHMED ELHILAL,
Senior Technical Advisor (1999-present), Aberdeen Drilling School
Directing training and designing drilling courses, taught to thousands of well-site supervisors and
engineers operating in the British, Dutch and Norwegian sectors of the North Sea and worldwide
including South and North America, Africa, the Far East, Middle East & Caspian.**

www.petroedgeasia.net



HPHT WELL ENGINEERING

19 – 23 March 2012 Kuala Lumpur, Malaysia

Training Course Overview

Conventional HPHT (High Pressure - High Temperature) conditions (>10,000 psi and 300° F) are becoming routine drilling targets in many basins worldwide, as exploration and production examine deeper and hotter objectives. This course will equip participants with knowledge and skills of HPHT well engineering and the components required for well planning and issues which influence successful drilling in such conditions.

The 5 day course interactive course and workshop (with teamwork exercises) focuses on the key characteristics and challenges of HPHT wells from a well design, planning, engineering and operational perspective which includes key learnings from HPHT case histories.

Key Learning Outcome from attending this World-Class training course

At the end of this course, participants will have an enhanced practical knowledge and understanding of the following critical areas, and be able to apply them to their own HPHT operations to optimize safety and operational efficiency:

- ❖ Well design
- ❖ Outline rig considerations
- ❖ G&G considerations
- ❖ Casing design considerations
- ❖ Cementing
- ❖ Drilling fluids considerations
- ❖ Drill bit considerations
- ❖ BHA & drill string considerations
- ❖ Outline completion & testing considerations
- ❖ DWOP / technical limit
- ❖ HPHT well control
- ❖ HPHT well control exercises
- ❖ HPHT new technologies

This 5 Day Training Course is Designed for

Operator, drilling contractor and service personnel who are either office-based or rig-based who are involved in planning, drilling programme writing, specialist service provision and offshore execution, including:

- ❖ Operator personnel (e.g. drilling managers, superintendents, well-site supervisors, drilling engineers, G&G personnel, testing and completion personnel who seek an understanding of the difficulties involved in the planning and execution of HPHT drilling campaigns);
- ❖ Drilling Contractor personnel (e.g. rig managers, engineers, OIM's, senior toolpushers / toolpushers and drillers);
- ❖ Service Company personnel (e.g. drilling fluids engineers, cementing engineers, directional drillers / planners);
- ❖ Equipment suppliers (e.g. wellheads, BOPE, downhole tools).

This training course has a limited attendance of up to **25 participants only**. Sessions commence at 9am on all days, with short intervals at 10.30am and 3.30pm respectively. Lunch will be provided at 12:30pm for 1 hour. Sessions will end at approximately 5pm on all days.

Learn more about our Strategic Learning Solutions for Oil & Gas
Call +65 67419927 or email info@asiaedge.net
www.petroedgeasia.net

HPHT WELL ENGINEERING

19 - 23 March 2012 Kuala Lumpur, Malaysia

5 DAY COURSE AGENDA

DAY 1

INTRODUCTION

- ❖ Industry Definition of High Pressure High Temperature
- ❖ Key Characteristics
- ❖ Key Challenges
- ❖ Application & Benefits
- ❖ Evolution / Developments / Achievements
- ❖ The Necessity for Total Teamwork
- ❖ Why HPHT Wells Fail – And Why Cost Over-runs Are Always Several \$million & Production Is Lower Than Prognosed

WELL DESIGN

- ❖ Jack-Up Considerations; Platform Considerations & Semi-Submersible / Drill-ship considerations – BOPE & Wellhead. Impact of vessel choice upon influx volume.
- ❖ Exploration well? Appraisal well? Development well? Is the well to be tested?
- ❖ Target Location
- ❖ Geological Hazards
- ❖ Well Trajectory
- ❖ The difficulties of “HPHT Designer Wells”
- ❖ Geological Formations & Rock Characteristics
- ❖ Reservoir Fluid Characteristics
- ❖ Fracture Pressure – And why fracture pressure weakens with high temperature and angle
- ❖ Pore Pressure – The pore pressure “ramp”
- ❖ The Difficult to Manage Transition Zone. The importance of accurate casing setting depth.
- ❖ Overburden Pressure
- ❖ Wellbore Stability / Instability Analysis
- ❖ Well bore ballooning / supercharging. How to plan for / how to include in the Drilling Programme – what to look for. Training. Finger-printing

DAY 2

WELL DESIGN (CONTINUED)

- ❖ Casing Setting Depth – In particular the Intermediate Casing String & Production String.
- ❖ Kick Tolerance.
- ❖ LOT vs. FIT – Why FIT is better

- ❖ Casing Strings & Wear. The importance of wear upon burst and collapse reduction. What can be done to reduce wear / how you can allow for wear.
- ❖ The use of Expandable Casing: Both Solid and Lattice Types.
- ❖ Contingency smaller hole sizes – 6” & 4 ¾” through the reservoir; “Slim-hole” Well Design as opposed to “Big Bore”.
- ❖ Deep Cement Displacement Design (2 Stage). Single Stage Cementation. HPHT Cement Design. The problems with conventional slurry design in high temperature environments.
- ❖ Drilling Fluids (Type, Friction Factors, Viscosity, Gel Strength, Mud Weight @ Angle, ECD, Swab, Surge, Barite Sag, Reservoir Fluids). In particular we will study barite sag, water-based mud and single gas bubble influx and oil-based mud with gas going into solution and the effects this can have on initially masking the kick size and problems when it unloads towards the surface. We will also look at flash points of hot returning oil based mud and whether mud coolers should be used.
- ❖ Bit Selection (The importance of utilising non-vibration-inducing drill bits particularly in weak fracture pressure zones)
- ❖ Reducing the risk of BHA twist-off / failure in expensive HPHT wells through optimal BHA Design (The importance of lateral, torsional & axial vibrations; accurate positioning of stabilisers, MWD / FEWD magnetometers and NMDC’s, RAB, RSS / Geo-Steering, Jar & Accelerometer placement, tool joint selection, tool joint inspection, importance of the Neutral Point remaining in the collars)
- ❖ Reducing the risk of Drill-string failure in expensive HPHT wells through optimal Drill-string Design & Selection – HWDP, DP - IU / EU / IEU drill-pipe – pros and cons, 5” / 5 ½” / 6 5/8” DP – pros and cons. Inspection. Maximum torque, drag & overpull. Maximum drilling depth of S135.
- ❖ Completion – Lower & Upper (Note:- In outline / key considerations format only).

Learn more about our Strategic Learning Solutions for Oil & Gas
Call +65 67419927 or email info@asiaedge.net
www.petroedgeasia.net

HPHT WELL ENGINEERING

19 - 23 March 2012 Kuala Lumpur, Malaysia

DAY 3

RIG SELECTION

- ❖ This section looks specifically at selecting the rig based upon its HPHT Well Control capabilities – specifically capabilities regarding losses and gains monitoring (coriolis / turbine FIFO – flow in / flow out), BOPE Pressure and Temperature Rating, Training of Rig Crew regarding ballooning / super-charging, finger-printing, drilling through the pressure ramp, HPHT Well Control.

TRAINING

- ❖ The importance of training – esp. “Total Training” – all the way from office through to rig personnel

DAY 4

DRILLING THE WELL

- ❖ Hydraulics & Hole Cleaning
- ❖ Directional Drilling (if well is directional). If not then drilling vertically will be discussed since MWD / FEWD will still be used. Heat effects on sensors.
- ❖ Torque / Drag / Overpull
- ❖ ECD / Swab / Surge. These areas are crucial particularly when drilling through the Transition Zone. We will study RIH and POOH speed in detail and the value of having a clean (i.e. non-balled-up) bit & BHA. We will study the use of PWD and Virtual Hydraulics.
- ❖ Mud Properties Monitoring. The effects of pressure and temperature upon mud properties.
- ❖ Pressure testing cement: Wet or Dry? The advantage of testing “Wet”.
- ❖ Cuttings & Cavings: What cavings tell us.
- ❖ “Reading” the Hole
- ❖ Anticipating Problems
- ❖ Preventing Problems (especially stuck pipe, wellbore collapse, casing wear and influxes)
- ❖ Finger-printing / managing “losses” and “gains” when drilling the elastic shale sections

WELL CONTROL

- ❖ Worst case scenarios
- ❖ Full evacuation to dry gas: what does this mean? Maximum SIWHP – do you subtract hydrostatic or is worst case reservoir pressure? We will look at both cases – in particular what happens when the gas bubble is not allowed to expand.
- ❖ Segregated / Swab Kicks. Pressure Distributed Kicks.
- ❖ Gas Behaviour, Kicks & Control: Influence of gas expansion.
- ❖ Why simplistic assumptions in HPHT well design are not acceptable
- ❖ The Real Gas Law
- ❖ Effects of small undetected kicks on well control procedure
- ❖ Gas solubility
- ❖ Well Control Methods (Maintaining Constant BHP)
- ❖ Gas Handling, Capacities & Procedures (Effects of kick on performance of surface equipment)
- ❖ Hydrates

DAY 5

KEY LEARNINGS FROM CASE HISTORIES

- ❖ Past examples showing successes & failures – and the reasons

HPHT WELL CONTROL EXERCISES

- ❖ Operational Case History 1
- ❖ Operational Case History 2
- ❖ Operational Case History 3

HPHT NEW TECHNOLOGIES

- ❖ Well Control Software Modelling
- ❖ Real Time Pore Pressure
- ❖ Pore Pressure from Seismic
- ❖ Resin-based Cement (to allow for annular expansion)
- ❖ Turbine-based FIFO Flow In Flow Out Systems
- ❖ HPHT PWD Pressure Whilst Drilling – ECD / Surge / Swab Management
- ❖ Virtual Hydraulics
- ❖ HPHT Down-hole Tool Sensors – Reliability Increase

COURSE CONCLUSION

- ❖ Q & A and Course Closure

Learn more about our Strategic Learning Solutions for Oil & Gas
Call +65 67419927 or email info@asiaedge.net
www.petroedgeasia.net

HPHT WELL ENGINEERING

19 – 23 March 2012 Kuala Lumpur, Malaysia

In association with the Aberdeen Drilling Schools, UK



Aberdeen Drilling Schools (ADS) has been at the vanguard of operational training for High Pressure High Temperature drilling and well control since the 1980s, having run public courses and client/project-specific sessions for hundreds of client companies. ADS has recently conducted dedicated class-based and well-site HPHT training and consultancies for clients in the UK (Shell, Talisman Energy, ConocoPhillips, Gaz de France), Azerbaijan (BP Azerbaijan, JNOC), Egypt (BP, ENI, BG), Norway (Statoil, ENI Norge, Norske Shell), Canada (Canadian Superior), India (ONGC, Transocean, Reliance Industries, Gujarat State Petroleum Corp.), Cameroon (Noble Energy) and Nigeria (Shell, ExxonMobil). ADS has also authored and revised the HPHT Policies and Procedures of several major Operator clients.

Course Director: DR. J. AHMED ELHILAL

Aberdeen Drilling School, Senior Technical Advisor (1999-present). Directing training and designing drilling courses, taught to thousands of well-site supervisors and engineers operating in the British, Dutch and Norwegian sectors of the North Sea and worldwide including South and North America, Africa, the Far East, Middle East & Caspian.

Technical Authoring

More than 50 Manuals in Drilling Technologies, Drilling Practices, HPHT Procedures, Deepwater Procedures, Well Control Manuals written for clients including: BP / Enterprise Oil (Shell) / BG / StatoilHydro /Talisman /Esso Norge / Sonatrach / Elpaso. Subject-specific manuals written for: Advanced Casing Design; Advanced Drilling Technology; Multilateral & Directional Well Control Procedures; Drill String Design & Failures; Basic and Advanced Well Control Manuals; Casing & Cementing; Stuck Pipe.

Advanced Well Engineering Modelling / Advanced Kick Tolerance Matrix Calculations

Advanced Well Control Simulation using multiphase flow simulators - HPHT and Deepwater Wells

Participated in more than 45 **HPHT** Projects and more than 25 **Deepwater** Wells in the past 18 years, including:

BP:	SDX4/HPX1 (Azerbaijan); Raven, Satis & Taurus Wells (Egypt); Red Mango Wells; Havsula (Norway); Angola Deepwater Projects
STATOIL HYDRO:	Morvin; Kristin; Verona; Tulipan; Godrun; Peon; Stetind; S4H; Vega Wells
BG:	Calloway; Jackdaw; Maria/ Malory; Je 72/Mandarin; Jordbaer; Miskar; Notus; Ipanema
SHELL:	Silangan (Philippines); Benbecula & Dooish Wells (UK/Norway); Italy; Brunei & Gumusut wells/ Heron
MAERSK;	Gita/ Luke/ Culzean
TOTAL:	Glenelg
TALISMAN:	TR3
ESSO NORGE:	Kogge/ Elpaso: Mariner
NEXEN:	Black Horse/Saracen

Recent testimonials from participants from HPHT Engineering training courses conducted by Aberdeen Drilling Schools, UK

"The best HPHT course I've attended with many useful discussions and a highly practical approach to potential problems."

Senior DSV, Shell

"I loved the scenario based on [our] program!"

Drilling Engineer, JNOC

"Very practical course, good for team building and improving HPHT knowledge."

Driller, Transocean

"This course has given me more confidence in my ability to control the well successfully."

OIM, Transocean

Learn more about our Strategic Learning Solutions for Oil & Gas

Call +65 67419927 or email info@asiaedge.net

www.petroedgeasia.net

REGISTRATION FORM

Kuala Lumpur, Malaysia 19 – 23 March 2012	Early Bird Price	<input checked="" type="checkbox"/>	Normal Price	<input checked="" type="checkbox"/>	TEAM DISCOUNTS
5 day – HPHT Well Engineering : Per Person Register as a team and save more!	S\$ 5499		S\$ 5699		PetroEdge recognises the value of leaning in teams. Group bookings at the same time from the same company receive the following: 3 or more at 5% off 5 or more at 7% off 8 or more at 10%
PetroEdge In-house Training Solutions { } Yes, I would like to organise this training on-site and save over 25% of total course fees! For further information about On-site Solutions, please call +65 67419927 or email info@asiaedge.net					Team discounts are exclusive of Early Bird discounts or other promotions.

DELEGATE DETAILS

Delegate 1: _____
Mr Mrs Ms Dr Other

Telephone: _____ Email: _____

Job Title: _____

Department: _____

Delegate 2: _____
Mr Mrs Ms Dr Other

Telephone: _____ Email: _____

Job Title: _____

Department: _____

Approving Manager: _____

Company: _____

Address: _____

Country: _____

Postcode: _____

Attention Invoice to: _____

Telephone: _____

Fax: _____

Email: _____

4 Easy Ways to Register

Online: www.petroedgeasia.net

Email: info@asiaedge.net

Phone: (65) 67419927

Fax: (65) 67478737

Please note:

- indicate if you have already registered by Phone Fax Email Web
- if you have not received an acknowledgement before the training course, please call us to confirm your booking.
- photocopy this form to register multiple delegates.

Payment Methods

By Cheque/ Bank Draft: Make Payable to Asia Edge Pte. Ltd.
By Direct Transfer: Please quote AE1 with the remittance advise
Account Name: Asia Edge Pte. Ltd.

Bank Number: 508 Account Number: 762903-001 Swift Code: OCBCSGSG
All bank charges to be borne by payer. Please ensure that Asia Edge Pte Ltd receive the full invoiced amount.

PAYMENT POLICY: Payment is due in full at the time of registration. Full payment is mandatory for event attendance. I agree to Asia Edge Pte Ltd. payment terms

CANCELLATIONS & SUBSTITUTIONS: You may substitute delegates at any time. ASIA EDGE PTE LTD does not provide refunds for cancellations. For cancellations received in writing more than seven (7) days prior to the training course you will receive a 100% credit to be used at another ASIA EDGE PTE LTD training course for up to one year from the date of issuance. For cancellations received seven (7) days or less prior to an event (including day 7), no credits will be issued. In the event that ASIA EDGE PTE LTD cancels an event, delegate payments at the date of cancellation will be credited to a future ASIA EDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. In the event that ASIA EDGE PTE LTD postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit representing payments made towards a future ASIA EDGE PTE LTD event. This credit will be available for up to one year from the date of issuance. No refunds will be available for cancellations or postponements.

ASIA EDGE PTE LTD is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. ASIA EDGE PTE LTD shall assume no liability whatsoever in the event this training course is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, unforeseen occurrence or any other event that renders performance of this training course impracticable or impossible. For purposes of this clause, a fortuitous event shall include, but not be limited to: war, fire, labor strike, extreme weather or other emergency.

PROGRAM CHANGE POLICY: Please note that speakers and topics were confirmed at the time of publishing; however, circumstances beyond the control of the organizers may necessitate substitutions, alterations or cancellations of the speakers and/or topics. As such, ASIA EDGE PTE LTD reserves the right to alter or modify the advertised speakers and/or topics if necessary. Any substitutions or alterations will be updated on our web page as soon as possible.

ASIA EDGE PTE. LTD. Company Registration No: No. 200710561C Copyright © 2005 ASIA EDGE PTE LTD. All rights reserved. This brochure may not be copied, photocopied, reproduced, translated, or converted to any electronic or machine-readable form in whole or in part without prior written approval of ASIA EDGE PTE LTD

Learn more about our Strategic Learning Solutions for Oil & Gas
Call +65 67419927 or email info@asiaedge.net
www.petroedgeasia.net