COURSE OVERVIEW DE0610-4D
Advanced Drilling Technology

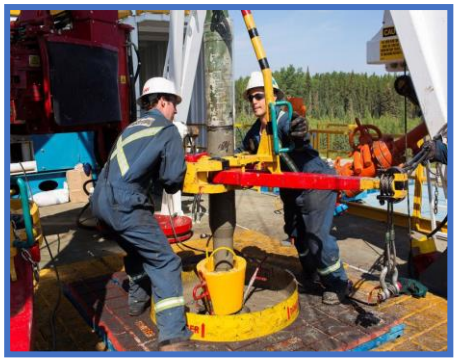
Course Title
Advanced Drilling Technology

Course Date/Venue
November 18-21, 2024/ Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
DE0610-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of advanced drilling technologies. It covers the advanced drilling techniques for horizontal drilling, multilateral drilling, extended reach drilling and complex path drilling; the directional drilling and ERD and the various types of directional wells; the extended reach drilling (ERD) and the condition of ERD wells; the dogleg severity, survey calculations and accuracy covering directional well design, well path calculation and well surveying; the conveyance-down and out in the oil field; and improving hole cleaning on high angle wells.

During this interactive course, participants will learn the multilateral drilling and completion technology based on solid expandable tubular fixing system; the underbalanced drilling technology and the regulatory barriers to underbalance drilling; the air drilling, air drilling dusting, air drilling benefits and air/dust drilling layout; the deflection tools and techniques including torque and drag calculations; and the drilling cementing, types of cementing processes and cementing problems.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an advanced knowledge on drilling technologies
- Carryout advanced drilling techniques for horizontal drilling, multilateral drilling, extended reach drilling and complex path drilling
- Discuss directional drilling and ERD and identify the various types of directional wells
- Explain extended reach drilling (ERD) and the condition of ERD wells
- Recognize dogleg severity and apply survey calculations and accuracy covering directional well design, well path calculation and well surveying
- Discuss conveyance-down and out in the oil field and improve hole cleaning on high angle wells
- Explain multilateral drilling and completion technology based on solid expandable tubular fixing system
- Discuss underbalanced drilling technology and the regulatory barriers to underbalance drilling
- Identify air drilling, air drilling dusting, air drilling benefits and air/dust drilling layout
- Carryout deflection tools and techniques including torque and drag calculations
- Recognize drilling cementing, types of cementing processes and cementing problems

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of advanced drilling technology for drilling engineers, drilling engineering supervisors, drilling operations section leaders, tool pushers, managers, well engineers and technical support personnel.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **2.4 CEUs** (Continuing Education Units) or **24 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Hesham Abdou, PhD, MSc, BSc, is a **Senior Drilling & Petroleum Engineer** with over **35 years** of integrated industrial and academic experience as a **University Professor**. His specialization widely covers in the areas of **Drilling & Completion** Technology, **Directional Drilling**, **Horizontal & Sidetracking**, **Drilling Operation** Management, **Drilling & Production** Equipment, **ERD Drilling & Stuck Pipe** Prevention, **Natural & Artificial Flow Well Completion**, **Well Testing** Procedures & Evaluation, **Well** Performance, **Coiled Tubing** Technology, **Oil Recovery Methods** Enhancement**, Well Integrity** Management, **Well Casing & Cementing**, **Acid Gas** Removal, **Heavy Oil Production** & Treatment Techniques, **Crude Oil Testing & Water Analysis**, **Crude Oil & Water** Sampling Procedures, **Equipment Handling** Procedures, **Crude & Vacuum Process** Technology, **Gas Conditioning & Processing**, **Cooling Towers** Operation & Troubleshooting, **Sucker Rod Pumping**, **ESP & Gas Lift**, **PCP & Jet Pump**, **Pigging** Operations, Electric Submersible Pumps (**ESP**), Progressive Cavity Pumps (**PCP**), **Water Flooding**, **Water Lift Pumps** Troubleshooting, **Water System Design** & Installation, **Water Networks Design** Procedures, **Water Pumping** Process, **Pipelines**, **Pumps**, **Turbines**, **Heat Exchangers**, **Separators**, **Heaters**, **Compressors**, **Storage Tanks**, **Valves** Selection, **Compressors**, **Tank & Tank Farms** Operations & Performance, **Oil & Gas Transportation**, **Oil & Gas Production** Strategies, **Artificial Lift** Methods, **Piping & Pumping** Operations, Oil & Water Source Wells Restoration, **Pump** Performance Monitoring, **Rotor Bearing** Modelling, **Hydraulic** Repairs & Cylinders, **Root Cause Analysis**, **Vibration & Condition** Monitoring, **Piping Stress** Analysis, **Amine Gas Sweetening & Sulfur Recovery**, Heat & Mass Transfer and Fluid Mechanics.

During his career life, Dr. Hesham held significant positions and dedication as the **General Manager**, **Petroleum Engineering Assistant General Manager**, **Workover Assistant General Manager**, **Workover Department Manager**, **Artificial Section Head**, **Oil & Gas Production Engineer** and **Senior Instructor/Lecturer** from various companies and universities such as the Cairo University, Helwan University, British University in Egypt, Banha University and Agiba Petroleum Company.

Dr. Hesham has a **PhD** and **Master** degree in **Mechanical Power Engineering** and a **Bachelor** degree in **Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Peer Reviewer**. Dr. Hesham is a member of Egyptian Engineering Syndicate and the Society of Petroleum Engineering. Moreover, he has published technical papers and journals and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 6,750 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday, 18th of November 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 - 0830	***PRE-TEST***
0830 – 0930	***Advanced Drilling Techniques*** *Horizontal Drilling, Multilateral Drilling, Extended Reach Drilling, Complex Path Drilling • Applications of Directional Drilling • Types of Directional Well Profile • Survey Measurement • Down-hole Components • Surface Equipment • Measurement While Drilling (MWD) • Mud Pulse Telemetry • Survey Instruments • Geosteering • Formation Evaluation Measurements • Surveying Calculations • Tangential Method • Average Angle Method • Directional Problem • Dogleg Calculation • Whipstock • Theory of Operation*
0930 - 0945	*Break*
0945 - 1100	***Directional Drilling & ERD*** *Definition • What are Directional Wells • Types of Directional Wells • Why Drill Directionally • Planning a Directional Well • How to Drill Directionally • Horizontal Drilling • Video • How to Do Horizontal Directional Drilling Calculation Planning • Exercise – 2 • Solution • Example – 1: Design of Directional Well*
1100 – 1230	***Directional Drilling & ERD (cont'd)*** *Build Selection • M = MD Vert. + MD Build + MD Hold • Procedure – Find • Solve • Direction Drilling • Directional Tools • Exercise – 3: Considering Bed Dips • Complex Wells • Directional Drilling Terminologies AZIMUTH • Exercise – 4: • Quizz – 2 • Solution Quizz – 2 • Quiz – 3 • Solution Quiz – 3 • Quiz – 4 • Solution Quiz – 4*

1230 - 1245	*Break*
1245 - 1315	***Extended Reach Drilling (ERD)*** *What is ERD Oil? • What is Condition of ERD Wells? • What is Complex Path Drilling • How is Directional Drilling Done? • What is Extended Reach Drilling Explain with Diagram • Five Most Common Drilling Methods Used in Oil & Gas Exploration • Why is Horizontal Drilling Better? • Video • Planning & Conducting an ERD Program • Three Major Technology Breakthrough • Main Applications • Directional Wells are Commonly Drilled • Geological Side Tracking • Onshore Operations • Offshore Operations • Relief Well Drilled Directionally • Terminology • Main Trajectories • Build-Rate Classification (Tentative)*
1315 – 1420	***Extended Reach Drilling (ERD) (cont'd)*** *Variables for Survey Calculations • Need for Measurements • Use of Measurements • Main Parameters to Measure • Measurement of Directional & Formation Evaluation Parameters • Measurement of Directional & Formation Evaluation Parameters Real Time Tools • Transmission • Telemetry – New Technologies • Different Measurement with a MWD and /or a LWD • Control of the Trajectory – General Principle • Deployment of Tools & Technologies for Directional • Positive – Displacement Motor (PDM) Components • Typical Steerable Motors Configuration • Deployment of Tools & Technologies for Directional Drilling Bend Sub • Deployment of Tools & Technologies for Directional Drilling • Horizontal Well – Profiles • Example of a Horizontal Gas Development*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: ***Tuesday, 19th of November 2024***

0730 – 0930	***Dogleg*** *What is Dogleg Severity? • What is Maximum Dogleg Severity? • What are Problems Resulted in because of Severe Dogleg • Dog Leg Severity (DLS) • Converting Between AZIMUTHS & Bearing*
0930 – 0945	*Break*
0945 – 1100	***Survey Calculations & Accuracy*** *Directional Well Design • Application • Directional Well Types • Planning the Well Profile • Parameters Defining the Well Path • Target & Geography • Defining the Well Path • Well Path Calculation • Build-Hold & Drop • Directional Drilling Tools • Well Surveying*
1100 - 1230	***Survey Calculations & Accuracy (cont'd)*** *Surveying Tools • Surface Locations & Targets • Planning the Well Path • Trajectory Calculations • Directional Survey Calculations • Well Path • Drill String Design (Limitations) • Scenario of Vertical Drilling • References • Appendix 1*
1230 - 1245	*Break*

1245 – 1420	***Conveyance-Down & Out in the Oil Field*** *Holding On or Cutting the Wire*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: ***Wednesday, 20th of November 2024***

0730 - 0930	***Improving Hole Cleaning on High Angle Wells*** *Problem Statement • Objectives & Scope of Study • Significance of the Study • Bingham Model • Power Law Model • Cutting Size • Cutting Shape • Angle of Inclination*
0930 – 0945	*Break*
0945 – 1100	***Improving Hole Cleaning on High Angle Wells (cont'd)*** *Annular Velocity • Tools & Equipment Required • Advantages of Using CFD Modelling • Procedure of Modeling Using GAMBIT 2.2.30 Software • Results & Discussion • Conclusion & Recommendations*
1100 - 1230	***Multilateral Drilling & Completion Technology Based on Solid Expandable Tubular Fixing System***
1230 - 1245	*Break*
1245 – 1420	***Underbalanced Drilling Technology*** *UB Drilling – Jobs • Underbalanced Drilling in the United States • UBD Definition • UBD – Types • Barriers to UB Drilling • Regulatory Barriers to UnderBalance Drilling • Barriers to UB D&C • Operators Barriers • Operators Problems • Reasons for UB Growth • UBD Forecast by Region • Technical Improvements • Reasons for UB Drilling • Effect of Skin on Production Rates • Physical Limitations to UBD • Production Limits to UBD • Types of Flow Regimes • Generalized "Fluid" Systems • Equipment – Rotating Head • Closed Loop Circulation System • Equipment – Gas Source*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: ***Thursday, 21st of November 2024***

0730 – 0830	***Air Drilling*** *Air Drilling • Air Drilling Dusting • Air Drilling Benefits • Air/Dust Drilling Layout • Misting • Foam Drilling – Basic Comments • Foam Drilling • Foam (Heading) • Improved Hole Cleaning • Foam Drilling Benefits • Mist or Foam Drilling Layout • Gaseated or Aerated Drilling • Aerated Fluid • Parasite String • Aerated Fluid Layout • Aerated Drilling Problems*

0830 - 0930	***Deflection Tools & Techniques*** *Natural Formation Effects • Drill Collars • Heavy-Weight Drill Pipe (HWDP) • Stabilizers • Roller Reamers • Forces Acting on the Bit • Rotary Assemblies • Building Assembly • Holding Assemblies • Dropping Assemblies • Deflecting Tools • Whipstocks • Jet Deflection • Rebel Tool • Downhole Motor & Bent Sub • Downhole Turbines • Orientation of Deflecting Tools • Toolface Setting • Orienting Procedure • Specialized Deflection Techniques • Curved Conductors • Slant Hole Drilling • Questions*
0930 – 0945	*Break*
0945 – 1100	***Torque & Drag Calculations*** *Friction – Stationary • Sliding Motion • Frictionless, Inclined, Straight Wellbore: • Effect of Friction (No Doglegs) • Problem 1 • Solution • Problem 2 • Problem 2 – Solution – Force • Problem 2 – Equation – Horizontal • Horizontal – Torque • Problem 3 • Solution to Problem 3 • Solution to Problem 3 – Rotating • Solution to Problem 3 – Lowering • Solution to Problem 3 – Raising • Solution to Problem 3 – Summary • Effect of Doglegs*
1100 – 1230	***Drilling Cementing*** *Cementing • Types of Cementing Processes • Primary Cementation • Secondary Cementation • Cementing Equipment • Mixing Cement • Wiper Plugs • Cementing Head • Preparation for Cementing Program • Calculation • Successful Cementation • Mixing Cement (Basis is 1 sk. of cmt.) • Rotary Drilling Cementing (Basis is 1 sk. of cmt.) • Problem • Cementing Calculations*
1230 – 1245	*Break*
1245 - 1345	***Cementing Problems*** *Problem 1: Poor Displacement of Mud • Plug Flow Cementation • Turbulent Flow Cementation • Problem 3: Bridges Composed of Cement Filter Cake • Problem 4: Swapping Out of Mud & Cement Below Pipe • Problem 5: Flash Setting of Cement • Problem 6: Cement can Shrink & May Fail to Isolate Zones • Problem 7: Permeability of Cement may Cause an Interzonal Flow • Problem 8: Gas Migration May Fail to Isolate Zones • Problem 9: A Micro-Annulus • Problem 10: Temperature Retrograde of Cement • Problem 11: Perforation of Cement Mechanism*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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