COURSE OVERVIEW DE0859
Drilling Problems and Drilling Optimization (E-Learning Module)

Course Title
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Course Reference
DE0859

Course Format & Compatibility
SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration
30 online contact hours
(3.0 CEUs/30 PDHs)

Course Description

This E-Learning course is designed to provide participants with a detailed and up-to-date overview of drilling problems and drilling optimization. It covers the well site preparation, drilling bits, down hole tools, well head and cold cutter; the hot welding, directional drilling, gyro survey and logging; the well types, site preparations, drilling sequence, cementing chemicals, cementing equipment and cementing job types; the logging techniques wire line operations, TLC operations and tractor operations; and the drilling bits, bit sub, shock sub, drill collar, string stabilizers, near bit stabilizers, roller reamer, jar, heavy weight drill pipe and drill pipe.

Further, the course will also discuss the measurement while drilling and logging while drilling including drilling abbreviations; the casing design, the types of strings of casing and standardization of casing; the type of coupling, casing threads and couplings; the grades of casing recognized by the API; the tensile force balance on pipe body and commonly used bit sizes; the selection of casing setting depths; the casing design, well data, mud pump data, slow pumps rate data, formation strength test data and kick data; and the drilling problems, sticking mechanisms, unconsolidated formations, mobile formations and fractured & faulted formations.

During this course, participants will learn the reactive formations, hole cleaning, tectonically stressed formations, stuck pipe and fishing operations & tools; the side track operations, sticking mechanisms, drilling parameters, progress charts, mechanical effects and chemical effects; and the principle of inhibition, bit balling, mud rings, tight hole from swelling, washouts, pressured shales and sloughing shales.

Course Objectives

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

- Apply and gain an in-depth knowledge on drilling problems and drilling optimization
- Carryout well site preparation and identify drilling bits, down hole tools, well head and cold cutter
- Illustrate hot welding, directional drilling, gyro survey and logging
- Recognize well types, site preparations, drilling sequence, cementing chemicals, cementing equipment and cementing job types
- Apply logging techniques wire line operations, TLC operations and tractor operations
- Describe drilling bits, bit sub, shock sub, drill collar, string stabilizers, near bit stabilizers, roller reamer, jar, heavy weight drill pipe and drill pipe
- Define measurement while drilling and logging while drilling including drilling abbreviations
- Illustrate casing design and recognize the types of strings of casing and standardization of casing
- List the type of coupling and discuss casing threads and couplings, grades of casing recognized by the API, tensile force balance on pipe body and commonly used bit sizes
- Select casing setting depths and illustrate casing design, well data, mud pump data, slow pumps rate data, formation strength test data and kick data
- Recognize drilling problems, sticking mechanisms, unconsolidated formations, mobile formations and fractured & faulted formations
- Describe reactive formations, hole cleaning, tectonically stressed formations, stuck pipe and fishing operations & tools
- Employ side track operations and discuss sticking mechanisms, drilling parameters, progress charts, mechanical effects and chemical effects
- Explain principle of inhibition, bit balling, mud rings, tight hole from swelling, washouts, pressured shales and sloughing shales

Who Should Attend

This course provides an overview of all significant aspects and considerations of drilling problems and drilling optimization for

This course covers systematic techniques on drilling optimization for those who are working in the field of well engineering, oil and gas exploration, geology and reservoir modelling.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

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 1-2013 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 1-2013 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 **3.0 CEUs** (Continuing Education Units) or **30 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.

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test

Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Fee

As per proposal

Course Contents

- Well Site Preparation
- Hammering
- Drilling Bits
- Down Hole Tools
- Well Head
- CMT
- Cold Cutter
- Hot Welding
- Directional Drilling
- Gyro Survey
- Logging
- Well Types, Site Preparations & Drilling Sequence
- Cementing Chemicals
- Dry CMT (Base Materials is Silica)
- Retarder (Base Materials is Sugar)
- Friction Reducer (Example: CFR-3 (Halliburton))
- Accelerator (Base Materials is Salt such as KCL, NaCl)

- Fluid Loss (Example: Halad-344 & -314)
- Fiber (It's similar to the LCM)
- Bentonite (The Base of the CMT Mix Water)
- Barite (Weighted Materials)
- Cementing Equipment
- Compressor (Air Source for Dry Cement Silos & Cutting Table)
- Cutting Table (Cut Dry CMT Big Bags & Transfer to Dry CMT Silos by Air Compressor Charge)
- Dry CMT Silos (Dry CMT Store & Transfer to CMT Unit (RCM) or Batch Mixer Using Air Compressor)
- CMT Unit (Consists of Displacement Tanks, RCM, Two Triplex Pumps, Many Centrifugal Pumps, Densitometer)
- Batch Mixer (Consists of Two Tanks with Agitators & Many Centrifugal Pumps)
- CMT Accessories (HP Lines (1502), 5" Suction Lines, Chicsans, Swivels, LTV's (low torque valves) CMT Head)
- Cementing Job Types
- Single or One Stage CMT Jobs
- Two Stages CMT Job
- On/Single Stage "Tail Slurry/Light Weight
- Logging Services – Open Hole Logging
- Triple Combo 1st OH Logging Run (GR-R-D-N-SP) to prove pay zone & Presence of HC
- Sonic – Dip Meter – GR (to prove the formation deepening)
- VSP (Mud Log & Formation Tops Correlation Run)
- RFT or RDT (To Calculate the Reservoir Pressure & Take Samples of Formation Fluid)
- CBL-VDL-USIT-CCL (Cement Evaluation Log)
- RST (OWCF Detection & Calculations
- Logging Services – OH & CH Logging Techniques
- Wire Line Operations in Vertical Wells & Deviated Wells Up to +/- (60-65) Deg.
- TLC Operations in Deviated & Highly Deviated Wells > 65 Deg.
- Tractor Operations in Deviated & Highly Deviated Wells > 65 Deg.
- LWD for all OH Logs
- BHA Design (Components)
- Drilling Bits (Rock & PDC)
- Bit Sub (Including Float Valve)

- Shock Sub (SS)
- Drill Collar (DC)
- String Stabilizers (S.STB) & Near Bit Stabilizers (NB.STB)
- Roller Reamer (RR) – (String & Near Bit)
- Jar (H/M & Fully Hydraulic)
- Heavy Weight Drill Pipe (HWDP)
- Drill Pipe (DP)
- Motor
- MWD (Measurement While Drilling)
- LWD (Logging While Drilling)
- BHA Design – Types
- Drilling Abbreviations
- Casing Design
- Types of Strings of Casing
- Drive Pipe or Structural Pile
- Conductor String
- Surface Pipe
- Intermediate String
- Production String (Csg.)
- Liner(s)
- Tubing String(s)
- Example Hole & String Sizes (in)
- Example Casing Programs
- Conductor (1 or 2) (40’ – 300’)
- Surface (300’ – 5000’)
- Intermediate CSG (1 or 2)
- Production CSG
- Drilling Liner
- Production Liner
- Standardization of Casing
- Classification of CSG
- Length of Casing Joints
- Outside Diameter (4.5 – 20”)
- Weight Per Foot

- Type of Coupling
- Casing Threads & Couplings
- CSG & LCSG
- API BCSG Connector
- API XCSG Connector
- API Connectors
- Strength
- Grades of Casing Recognized by the API
- Tensile Force Balance on Pipe Body
- Pipe Body Yield Strength
- Internal Yield Pressure for Pipe (Burst)
- Commonly Used Bit Sizes for Running API Casing
- Commonly Used Bit Sizes that will Pass Through API Casing
- Selection of Casing Setting Depths
- Casing Design – Collapse
- Casing Design – Tension
- Casing Design – Burst (from internal pressure)
- API Design Factors (typical)
- Kill Sheet
- Well Data
- Internal Capacities
- Annular Capacities
- Mud Pump Data
- Slow Pumps Rate Data
- Formation Strength Test Data
- Kick Data
- Drilling Problems
- Sticking Mechanisms
- Unconsolidated Formations -
- Mobile Formations
- Fractured & Faulted Formations
- Naturally Over-Pressured Shale Collapse
- Induced Over-Pressured Shale Collapse
- Reactive Formations

- Hole Cleaning
- Tectonically Stressed Formations
- Stuck Pipe
- Fishing Operations & Tools
- Side Track Operations (including Whip Stock Technique)
- Sticking Mechanisms
- Solids Induced Pack-Off
- First Actions
- Stick Slip – Observation, Solution & Remarks
- Whirl – Observation, Solution & Remarks
- Alamein Field
- IPR #1 Rig Spec's & Photos
- Lithology Column – CSG Design
- Drilling History
- Drilling Parameters
- 7" Liner w/ CMT & CBL-VDL-GR-CCL
- WBS, CSG & CMT Summary
- Progress Charts (Time versus Depth)
- Progress Charts (Cost versus Depth)
- Shale Problems
- Typical Problems
- Mechanical Effects
- Chemical Effects
- Principle of Inhibition
- Shale Problems
- Bit Balling
- Mud Rings
- Tight Hole from Swelling
- Washouts
- Pressured Shales
- Sloughing Shales
- Review of Shale Problems