COURSE OVERVIEW DE0324
Production Technology
(E-Learning Module)

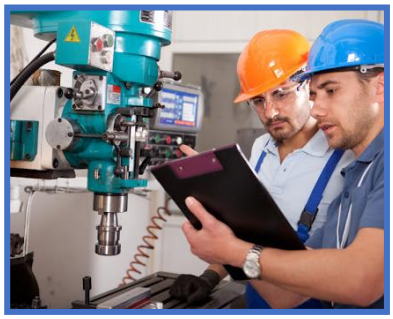
Course Title
Production Technology
(E-Learning Module)

Course Reference
DE0243

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 production technology. It covers the workover operations and well maintenance; the well barriers, types of barriers and barrier classification; the surface barrier, structural barrier, geological barrier, down hole barrier and hydrostatic barriers; the well integrity, high risk well, well completion types and well design considerations; the generic well completion design process; the factors affecting the well completion selection & design including the; factors affecting well completion and workover design; and the completion classification and its various types including the typical artificial lift application range.

Further, the course will also discuss the completion productivity, nodal analysis and quantifying well flow performance; the risks of formation damage; the drilling fluid selection, perforating and stimulation; the key considerations in selecting stimulation method, completion equipment and design practices; the tubing selection, completion design and well completion; the factors causing packer forces or tubing movement; the slip and seal assembly, production logging and completion evaluation; and the causes of fluid losses, mechanical well problems, well and completion problems and diagnosis reservoir flow problems.

Moreover, the course will also cover the perforation and completion design, wellbore conditions while perforating and overbalanced perforating; the factors affecting charge performance and shaped charge components; the perforating techniques, initiation systems, charge normalization, optimum completion design and completion design procedure; perforating under-balance to overcome total skin damage; the proper applications of wire line conveyed perforating; the firing systems, gun release and venting devices; the dual completions, standard rod pump completions, perforation cleaning, under-balance perforating and perforation washing; the pressure losses in oil production including the main types of artificial lift; the beam pumping, electrical submersible pumps, artificial lift selection, squeeze cementing and formation damage; and the common formation damage problems, factors, mechanisms and causes.

During this course, participants will learn the partial penetration, flow efficiency, common formation damage mechanisms and organic deposition; the mitigation methods, sandstone acidizing, stimulation techniques and matrix acidizing; the acid-mutual solvent volume requirements and most mistakes found in the application of the acid-mutual solvent method; the stimulation acidizing, hydraulic fracturing, carbonate acidizing, design of a matrix treatment and acid fracturing; the response of carbonates to acid fracturing; the key factors in carbonate acidizing; the wormhole pattern from radial flow, workover planning and problem recognition; the service unit functions, workover rigs functions and the tools used for well analysis; the water production mechanisms, well analysis, well maintenance and workover operations; the problem-well analysis and diagnosis; the conditions of the reservoir; and the decline curve analysis, workover planning, cost estimate preparation and zone isolation techniques.

Course Objectives

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

- Apply and gain an in-depth knowledge on production technology
- Carryout workover operations and well maintenance as well as identify the well barriers, types of barriers and barrier classification
- Recognize surface barrier, structural barrier, geological barrier, down hole barrier and hydrostatic barriers
- Describe well integrity, high risk well, well completion types and well design considerations
- Illustrate generic well completion design process and the identify the factors affecting the well completion selection & design including the factors affecting well completion and workover design
- Classify completion and identify its various types including the typical artificial lift application range
- Apply completion productivity, nodal analysis and quantifying well flow performance
- Identify the risks of formation damage and maximize well productivity as well as apply drilling fluid selection, perforating and stimulation
- Apply key considerations in selecting stimulation method, completion equipment and design practices

- Employ tubing selection, completion design and well completion and identify the factors causing packer forces or tubing movement
- Apply slip and seal assembly, production logging and completion evaluation
- Identify the causes of fluid losses, mechanical well problems, well and completion problems and diagnosis reservoir flow problems
- Illustrate perforation and completion design, wellbore conditions while perforating and overbalanced perforating
- Recognize the factors affecting charge performance and shaped charge components
- Employ perforating techniques, initiation systems, charge normalization, optimum completion design and completion design procedure
- Classify formation and determine perforating under-balance to overcome total skin damage
- Carryout proper applications of wire line conveyed perforating and recognize firing systems, gun release and venting devices
- Apply dual completions, standard rod pump completions, perforation cleaning, under-balance perforating and perforation washing
- Recognize the pressure losses in oil production including the main types of artificial lift
- Determine beam pumping, electrical submersible pumps, artificial lift selection, squeeze cementing and formation damage
- Identify the common formation damage problems, factors, mechanisms and causes
- Describe partial penetration, flow efficiency, common formation damage mechanisms and organic deposition
- Employ mitigation methods, sandstone acidizing, stimulation techniques and matrix acidizing
- Recognize the acid-mutual solvent volume requirements and most mistakes found in the application of the acid-mutual solvent method
- Illustrate stimulation acidizing, hydraulic fracturing, carbonate acidizing, design of a matrix treatment and acid fracturing
- Review the response of carbonates to acid fracturing and identify the key factors in carbonate acidizing
- Discuss wormhole pattern from radial flow, workover planning and problem recognition
- Identify service unit functions, workover rigs functions and the tools used for well analysis
- Describe water production mechanisms as well as apply well analysis, well maintenance and workover operations
- Apply problem-well analysis and diagnosis and determine the conditions of the reservoir
- Carryout decline curve analysis, workover planning, cost estimate preparation and zone isolation techniques

Who Should Attend

This course covers systematic techniques on production technology for new production technologists, reservoir engineers, geoscientists, petrophysicists, well engineers, drilling engineers, well services personnel, production engineers, facility engineers, surface engineers and managers who want to maximize production and recovery.

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: -

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association 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 Association 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

- Course Objectives
- Outlines
- Introduction
- Definitions
- What is Completion?
- Introduction
- What is Workover Operations?
- Well Maintenance
- Well Barriers
- Well Barriers Theory
- Barriers Theory
- Types of Barriers
- Mechanical Barriers Types
- Mechanical Barriers
- Hydrostatic Barriers
- Barrier Classification
- Types of Barriers

- Surface Barrier
- Structural Barrier
- Geological Barrier
- Down Hole Barrier
- Hydrostatic Barriers
- Example Barrier Classifications
- Example Completion Barrier Envelopes
- Completion Barriers
- Well Integrity
- Definition of Well Integrity
- The Foundation of Well Integrity
- Why is Well Integrity Important
- High Risk Well
- Well Integrity Assurance Task Force
- Task Force Purpose and Scope
- Well Completion Types
- What is Completion?
- Introduction
- Well Design Considerations
- Generic Well Completion Design Process
- Factors Affecting
- Factors affecting the Well Completion Selection & Design
- Factors Affecting Well Completion & Workover Design
- Completed Oil Well
- Completion Classifications
- Types of Completion
- Openhole Completions
- Well Completion Types
- Openhole Completions
- Open Hole Completion Types
- Advantages of Openhole Completions
- Uncemented Liner Completions
- Screen/Pre-perforated Liner Completion

- Uncemented Liner Completions
- Perforated Liner Completion
- Cemented Liner Completion
- Cased Hole Completion Type
- Perforated Completions
- Mode of Production Flowing Artificial Lift
- Completions for Pumping Wells
- Application Range
- Typical Artificial Lift Application Range
- Number of Zones Completion
- Single String Flowing Well Completion
- Single Completion
- Single String Flowing Well Completion
- Multizone Completions
- Multiple Zones Completion Schematics
- Multi-Zone Completion
- Subsea Completion
- Multi-zone TFL Subsea Completion Schematic
- Gas Producer Completions
- Water Injection Completions
- Horizontal Water Injection Completions
- Completion Selection and Design Criteria
- Completion Design Considerations
- Functional Requirements
- Drilling Considerations
- Table 4: Effect of Casing and Tubing Size on Maximize Theoretical Capacity
- Completion Productivity
- Oil Well Inflow Performance Relationship
- Pure Losses in Well System
- Inflow Performance Curve
- Outflow Performance Curve
- Uses of Nodal Analysis
- Solution Node at Wellhead

- Nodal Analysis
- System Graph – Nodal Analysis
- Reservoir Pressure Drop
- Quantifying Well Flow Performance
- Example of Nodal Program
- Reservoir Inflow
- Tubing Outflow
- Tubing Outflow – Fluid Weight
- Tubing Outflow – Friction Losses
- Tubing Outflow – Well Head Pressure
- The Oil Production Rate
- The Oil Rate – Initial Conditions
- The Oil Rate – Pressure Depletion
- Declining Oil Rate – Options?
- Improving Well Performance - Inflow
- Nodal Analysis Basic Concepts
- Completion Pressure Drop
- In-Class Exercise
- Solution
- Tubing Size Effect
- Water Cut Effect
- Gas Liquid Ratio Effect
- Flow Rate Effect
- Formation Damage
- Risks of Formation Damage
- Drilling Damage
- Perforation Damage
- Fluids Damage
- Sand Fill
- Maximizing Well Productivity
- Drilling Fluid Selection
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- Through-tubing Perforating

- Tubing Conveyed Perforations
- Selection of Completion Fluids
- Stimulation
- Key Considerations in Selecting Stimulation Method
- Summary
- Completion Equipment and Design Practices
- Collapse loads in the pay
- Tubing Selection
- Tubing
- Completion Design
- Tubing String Selection and Design Objectives
- Tubing Material
- Which Tubing Grade?
- Tubing Grade Examples
- Example of a Tubing-connection
- Tubing Selection Criteria (Forces & Stresses -1)
- Example of API tubing specification
- Definitions
- Tubing Selection Criteria (Forces & Stresses - 2)
- Tubing Selection/Design Factors
- Tubing - Detailed Specification
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- Tubing Burst
- Tubing Collapse
- Tubing Tension
- Bending Stresses
- Couplings and Threads
- Well Completion
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- What is the Packer?
- Why Run a Packer?
- Packers Applications
- Single Packer

- Dual Packer
- Packers-Mechanism
- Retrievable Packers
- Permanent Packers
- Permanent - Retrievable Packers
- Inflatable Packers
- Tubing / Packer Forces and Movement
- Factors Causing Packer Forces or Tubing Movement
- Mechanical Forces
- Temperature or Thermal Effects
- Piston Force Effects
- Ballooning Effects
- Buckling Effects
- Slip and Seal Assembly
- Anchors
- Tubing Anchors
- Seating Nipples
- Landing Nipples
- Purposes of Seating Nipples
- Selective Landing Nipples
- No-go Landing Nipples
- Sliding Sleeves
- Well Completion
- Sliding Sleeve Side Door – SSD
- Uses of Sliding Sleeves
- Side Pocket Mandrels
- Blast Joints
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- Expansion Joint
- Production Logging
- Why Production Logging?
- What is Production Logging?
- Completion Evaluation
- Causes of Fluid Losses
- Cased Hole Logging Sensors Overview
- Cased Hole Logging
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- Well and Completion Problems
- Diagnosis Reservoir Flow Problems
- Standard Production Logging Suite
- Temperature Log Response
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- Overbalanced Perforating
- Shaped Charge Perforator
- The Perforation Process
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- Shaped Charge Components
- Perforating Techniques
- Reusable Hollow Carrier Gun
- Expendable Shaped Charge Gun
- Parameters Affecting Performance
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- Factors Affecting Perforating Efficiency
- Drilling and Perforating Damage
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- Wellhead Pressure Control Equipment
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- Optimum Completion Design
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- Completion Design Procedure
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- Acoustic Data to Determine Δp
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- Applications of Wire Line Conveyed Perforating
- Firing Systems
- Gun Release
- Venting Devices
- Shot Detection
- Gun Positioning
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- Under-balance Perforating
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- Pressure Losses in Oil Production
- Main Types of Artificial Lift
- Gaslift
- Gas Lifted Well
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- Gas Lift
- Gas Lift is Preferred For
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- Pumping - Best Applied When:
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- ESP with Y-Tool
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- Squeeze Cementing
- Introduction
- Purposes of Squeeze Cementing
- Squeeze Terminology
- Squeeze Terminology
- Braden Head Squeeze Method
- Squeeze-packer Method
- Squeeze Pressure Requirements
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- Formation Damage Impact
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- Drilling Fluid Damage
- Common Formation Damage Problems, Factors, and Mechanisms
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- Water Block Damage
- Damage Due to Production
- Damage Quantified through Skin Factor & Productivity Index
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- Radial Production and Skin (Darcy's Law)
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- Geometric Skin – Partial Penetration
- Partial Penetration
- Geometric Skin – Deviated Wellbore
- Geometric Skin – Well with Hydraulic Fracture
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- Flow Efficiency
- Formation Damage
- Potential Sources of Formation
- Common Formation Damage Mechanisms
- Extraneous Materials
- Organic Deposition
- Mitigation Methods

- Treatment Fluids
- Sandstone Acidizing
- What Is Well Stimulation?
- Well Stimulation
- Objectives of Acid Stimulation
- Stimulation Techniques
- Matrix Acidizing
- Chemical Stimulation Without Acid
- Mineral Acids
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- Gas Wells
- Water Injection Wells
- Acid-Mutual Solvent Volume Requirements
- Mistakes Found in the Application of the Acid-Mutual Solvent Method
- Stimulation Acidizing
- Acids Used for Well Stimulation
- Additives for Acid Treatments
- Hydraulic Fracturing
- Carbonate Acidizing
- Matrix Stimulation
- Design of a Matrix Treatment
- Acid Fracturing
- Response of Carbonates to Acid Fracturing
- Matrix Stimulation
- Stoichiometry
- Kinetics of HCl Reaction
- Key Factors in Carbonate Acidizing
- Wormhole Penetration vs. Skin
- Acid Reactivity
- Mineral versus Organic Acids
- Injection Rates: Dissolution Patterns
- Impact of Pump Rate and Temperature
- Wormhole Pattern from Radial Flow

- Wormhole Growth for Various Rates
- Pore Level Model
- Placement
- Conclusions
- Workover Planning & Problem Recognition
- What is a Workover?
- Workover Methods
- Reasons for Working Over a Well
- Service Unit Functions
- Workover Rigs Functions
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- Well Analysis Tools
- Characteristic of Problem Wells
- Water Control Problem
- Identification & Solutions
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- Well Analysis
- The Well Maintenance Requirements for a Completion
- Well Maintenance
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- Workover Involving Drilling
- Workover Operations
- Summary of Common Problems & Workover Operations
- Workover Profitability Part II Step-by-Step Well Diagnosis
- Problem-Well Analysis and Diagnosis
- What Happens to a Dead Well?
- Step by Step Well Diagnosis
- Study the Mechanical History
- Study the Geologic Data
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- Well Production History
- Decline Curve Analysis
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- Why Run a Packer?
- Casing Patch
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