COURSE OVERVIEW DE0170
Pressure Transient Analysis & Practice

Course Title
Pressure Transient Analysis & Practice

Course Reference
DE0170

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Sessions	Date	Venue
1	July 15-19, 2024	Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE or, Online Virtual Training
2	September 16-20,2024	Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE or, Online Virtual Training
3	November 03-07,2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE or, Online Virtual Training
4	December 08-12, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE or, Online Virtual Training

Course Description

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

The pressure transient test is one of the more important tools for evaluating reservoir performance. By measuring the change of pressure over time, pressure transient information is obtained. The method entails measuring flow rates and pressures under a range of flowing conditions and applying the data to a mathematical model. Fundamental data relating to the interval under test, such as reservoir height and details of the reservoir fluids, are also part of the input.

In many cases, wells and reservoirs were managed according to the data based on pressure transient tests. However, as the quality of information obtained from a pressure transient test depends, among other things, on the quality of the pressure and flow data, it is imperative to prevent inaccuracy in the pressure and flow measurements to assure integrity of data. At present, conventional pressure transient testing methods have been adapted in the petroleum industry. These methods provide useful general indicators of reservoir permeability, the flow capacity of the reservoir and any damage that may be restricting productivity.

This course is designed for analysts to obtain a better understanding of the concepts, principles and practices used in pressure transient tests. It is important to understand the limitations of the assumptions being made and the practical implications they have on the interpretations derived from the test.

The course covers the fundamentals of fluid flow on porous media; the concept of flow and build-up test analysis; the development of type curves and its application in the well test; analysis of pressure-buildup distortion by phase redistribution and procedure; well-test data in naturally fractured reservoirs; and the various models of matrix flow.

At the completion of the course, participants will be able to employ proper procedures and techniques used in drillstem testing and analysis; identify the various methods of injection-well testing in a ratio reservoir condition; restate the concepts of interferences and pluse testing; implement well test and their specific purposes; demonstrate the steps of running, estimating and comparing the different types of horizontal well tests models; recognize the behavior of well and reservoir response patterns observed in well test and how to quantify them from pressure transient data.

Course Objectives

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

- Apply and gain an in-depth knowledge on pressure transient testing and reservoir performance evaluation
- Recognize the fundamentals of fluid flow in porous media including the diffusivity equation, initial and boundary conditions and deconvolution
- Introduce the concept of flow and build-up test analysis and explain its complications in actual tests
- Discuss the development of type curves and recognize its application in the well test
- Explain analysis of pressure-buildup distortion by phase redistribution and explain its procedure
- Interpret well-test data in naturally fractured reservoirs and list the various models of matrix flow
- Employ proper procedures and techniques used in drillstem testing and analysis
- Identify the various methods of injection-well testing in a ratio reservoir condition
- Restate the concepts of interferences and pulse testing including the recommendations for multiple-well testing
- Explain the types and designs and implementation of well test and understand their specific purposes
- Demonstrate the steps of running, estimating and comparing the different types of horizontal well tests models and be aware of its implications in the reservoir performance
- Recognize the behavior of well and reservoir response patterns observed in well tests, what well and reservoir parameters can be quantified, and how to quantify them from pressure transient data

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 a wide understanding and deeper appreciation of pressure transient testing and reservoir performance evaluation for production, operations and reservoir engineers, geologists, analysts field personnel, senior technicians and field supervisors with an engineering background and analysts involved with the design, supervision and interpretation of well tests who need to obtain a better understanding of the concepts, principles and practices used in pressure transient tests.

Course Fee

F2F Classroom: **US$ 8,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Online Virtual: **US$ 4,000** per Delegate + **VAT**.

Virtual Training (If Applicable)

If this course is delivered online as a Virtual Training, the following limitations will be applicable:-

Certificates	Only soft copy certificates will be issued to participants through Haward's Portal. This includes Wallet Card Certificates if applicable
Training Materials	Only soft copy Training Materials (PDF format) will be issued to participant through the Virtual Training Platform
Training Methodology	80% of the program will be theory and 20% will be practical sessions, exercises, case studies, simulators or videos
Training Program	The training will be for 4 hours per day starting at 0930 and ending at 1330
H-STK Smart Training Kit	Not Applicable
Hands-on Practical Workshops	Not Applicable
Site Visit	Not Applicable
Simulators	Only software simulators will be used in the virtual courses. Hardware simulators are not applicable and will not be used in Virtual Training

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 **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.

Accommodation

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

Course Instructor

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

Mr. Jamal Khaled is a **Senior Process & Petroleum Engineer** with over **25 years** of practical experience within the **Oil** & **Gas**, industry. His experience covers **Operation** of **Upstream & Midstream Process Facilities**, **Build-up Analysis**, **Well Test Analysis**, **Drillstem Testing** & **Analysis**, **Well Testing**, **Operation** of **Process Equipment** (Fired Heaters, Heat Exchangers, Air Coolers, Piping, Pumps, Compressors and Process Control & Troubles hooting), **Heat Exchanger** Design, Operation & Maintenance, **Surface Production** Operations, Advanced **Oil Wells**, Separation & Oil Treatment , Treatment of Oily Produced Water, **Gas Dehydration & Sweetening**, **Compressors & Utilities** System, **Flare & Disposal Systems** Operation & Troubleshooting, **Well Completion** Design & Operations, **Heat Exchangers**, **Fired Heaters**, **Process Plant Startup**, Commissioning & Troubleshooting, **Oil Movement** Storage & Troubleshooting, **Gas Compression** & Foundation, **Gas Compression Train** Operations & Maintenance, **Gas Dehydration** (**TEG**) Principles, Operations & Maintenance, **Gas Dehydration** (**Mole Sieve**) Operations & Maintenance, **Acid Gas Removal** (**AGRU**) Operations & Maintenance, **Gas Fractionation & Separation** Operations Principles & Practices, **Gas Processing** Chemical Treatment Principles, Advanced **Distillation** Operation, Troubleshooting **Process Operation** & Problem Solving, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Equipment** Operation, **Process Plant** Operation, **Process Plant** Optimization, **Oil & Gas Field** Operation, **Oil Movement**, Storage & Troubleshooting, **Petroleum Refinery** Process, **Process Reactor** Operation & Troubleshooting, **LNG & LPG** Plants Gas Processing, **Refinery Process** Operations Technology, **Distillation Column** Design & Operation, **Gasoline & Diesel Fuel** Technology, **Gas Sweetening & Sulfur Recovery**, **Gas Sweetening** Units, **Fractionation Towers**, **Gas Compressors**, **Flare & Pressure Relief Systems**, **NGL Recovery & Fractionation** and **Refrigerant & NGL Extraction**. Further, he is also well-versed in Oil & Gas **Producing Wells**, **Well Head** Design & Selection H2S, Sour Gas Compatible Material **X-Mas Tree**, **Electrical Submersible Pumping** (**ESP**) Operations, Design & Troubleshooting, **Sucker Rod Pumping System** Application, Operation, Troubleshooting & Maintenance, **Well Integrity Management** System, **X-Mass Tree & Wellhead** Operation & Testing, **Artificial Lift Systems**, Selection & Operation, **Artificial Lift Surface Equipment**, Advanced **Stuck Pipe Prevention & Fishing** Operation, **Casing**, **Cementing & Fluid**, **Pipeline & Pigging** Operations, **HP/IP/LP** Separation, Industrial **Water Treatment** System & Operations, **H2S**, **Confined Space Entry**, Permit To Work (**PTW**) and **Authorized Gas Tester**. He is currently the **On Job Instructor/Trainer** of Majnoon Oil Field.

During his career life, Mr. Jamal has gained his practical and field experience through his various significant positions and dedication as the **Oil & Gas Operation Instructor**, **OJT Operation Trainer**, **Operation & HSE Instructor**, **Operation & Competency Assessor/Internal Verifier**, **Operation Engineer**, **Operation Supervisor**, **Operation Section Head**, **Production Supervisor**, **Senior Operator** and **Senior Instructor/Trainer** from various international companies such as the AlFurat Petroleum Company (AFPC), ADCO, Basrah Gas Company-Iraq, North Rumaila NGL Plant, Anton Oilfield Services and Majnoon Oil Field-Iraq, just to name a few.

Mr. Jamal has a **Bachelor's** degree in **Petroleum Engineering**. Further, he is a **Certified Training of Trainer** (**ToT**), an **Authorized H2S Trainer**, a **Certified OPITO Competency Assessor**, an **Authorized Assessor/Verifier** in **Oil & Gas Operation**, a **Certified Instructor/Trainer** and has further delivered numerous trainings, courses, seminars, conferences and workshops 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 Program

The following program is planned for this course. However, the course instructor 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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introductions*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Fundamentals of Fluid Flow in Porous Media*** *Diffusivity Equation • Initial & Boundary Conditions • Dimensionless Groups • Solutions to the Diffusivity Equation*
0930 – 0945	*Break*
0945 – 1115	***Fundamentals of Fluid Flow in Porous Media (cont'd)*** *Superposition in Space • Superposition in Time • Deconvolution*
1115 – 1230	***Introduction to Flow & Buildup-Test Analysis: Slightly Compressible Fluids*** *Analysis of Flow Tests • Analysis of Pressure-Buildup Tests • Complications in Actual Tests*
1230 – 1245	*Break*
1245 – 1420	***Introduction to Flow & Buildup-Test Analysis: Slightly Compressible Fluids (cont'd)*** *Complications in Actual Tests • Analysis of Late-Time Data in Flow & Buildup Tests • Analyzing Well Tests with Multiphase Flow*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Introduction to Flow & Buildup-Test Analysis: Slightly Compressible Fluids*** *Pseudopressure & Pseudotime Analysis • Pressure & Pressure-Squared Analysis • Non-Darcy Flow*
0930 – 0945	*Break*
0945 – 1115	***Introduction to Flow & Buildup-Test Analysis: Slightly Compressible Fluids (cont'd)*** *Analysis of Gas-Well Flow Tests • Analysis of Gas-Well Buildup Tests*

1115 – 1215	***Well-Test Analysis by Use of Type Curves*** *Development of Type Curves • Application of Type Curves- Homogeneous Reservoir Model, Compressible Fluids • Correcting Initial Pressure in a Well Test*
1215 – 1230	*Break*
1230 – 1420	***Well-Test Analysis by Use of Type Curves (cont'd)*** *Reservoir Identification with Type Curves • Systematic Analysis Procedures for Flow and Buildup Tests • Well-Test-Analysis Worksheets*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Analysis of Pressure-Buildup Distorted by Phase Redistribution*** *Description of Phase Redistribution • Phase-Redistribution Model • Analysis Procedure*
0930 – 0945	*Break*
0945 -1115	***Well-Test Interpretation in Hydraulically Fractured Wells*** *Flow Patterns in Hydraulically Fractured Wells • Flow Geometry and Depth of Investigation of a Vertically Fractured Well*
1115 – 1215	***Well-Test Interpretation in Hydraulically Fractured Wells (cont'd)*** *Specialized Methods for Post-Fracture Well-Test Analysis • Post-Fracture Well-Test Analysis with Type Curves • Effects of Fracture and Formation Damage*
1215 – 1230	*Break*
1230 – 1420	***Interpretation of Well-Test Data in Naturally Fractured Reservoirs*** *Naturally Fractured Reservoir Models • Pseudosteady-State Matrix Flow Model • Transient Matrix Flow Model*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Drillstem Testing & Analysis*** *Conventional DST • Conventional DST Design • DST-Monitoring Procedures • DST Analysis Techniques • Closed-Chamber DST • Impulse Testing*
0930 – 0945	*Break*
0945 – 1115	***Injection-Well Testing*** *Injectivity Testing in a Liquid-Filled Reservoir: Unit-Mobility-Ratio Reservoir Conditions • Falloff Testing in a Liquid-Filled Reservoir: Unit-Mobility-Ratio Reservoir Conditions*
1115 – 1215	***Injection-Well Testing (cont'd)*** *Estimating Average Drainage-Area Pressure • Composite-System-Test Analysis for Nonunit-Mobility-Ratio Reservoir Conditions • Step-Rate Testing*
1215 – 1230	*Break*

1230 – 1420	***Interferences & Pulse Testing*** *Interferences Tests • Pulse Tests • Recommendations for Multiple-Well Testing*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Design & Implementation of Well Tests*** *Types & Purposes of Well Tests • General Test-Design Considerations • Pressure Transient Test Design • Deliverability-Test Design*
0930 – 0945	*Break*
0945 – 1100	***Horizontal Well Analysis*** *Field Examples • Running Horizontal Well Tests • Estimating Horizontal Well Tests • Comparison of Recent & Older Horizontal Well Models*
1100 – 1215	***Horizontal Well Analysis (cont'd)*** *Field Examples • Running Horizontal Well Tests • Estimating Horizontal Well Tests • Comparison of Recent & Older Horizontal Well Models*
1215 – 1230	*Break*
1230 – 1345	***General Discussion***
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor 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 the real-life case studies and exercises:-

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org