COURSE OVERVIEW DE0835
Well Stimulation Techniques & Treatments

Course Title
Well Stimulation Techniques & Treatments

Course Date/Venue
Session 1: February 04-08, 2024/Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey
Session 2: March 03-07, 2024/The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Course Reference
DE0835

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

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.

Reservoir stimulation and artificial lift are the two main activities of the production engineer in the petroleum and related industries. The main purpose of stimulation is to enhance the property value by the faster delivery of the petroleum fluid and/or to increase ultimate economic recovery.

Matrix stimulation and hydraulic fracturing are intended to remedy, or even improve, the natural connection of the wellbore with the reservoir, which could delay the need for artificial lift.

Many wells that would otherwise be classified as dry holes have been made into profitable producers by fracture, acid or explosive stimulation treatments.

This training course discusses the various well stimulation treatments that are frequently used to stimulate old or poorly producing wells. It will cover the stimulation techniques as tools to help manage and optimize reservoir development.

This comprehensive course is essential for petroleum industry professionals involved in the important activities of reservoir evaluation, development and management, who require invaluable skills in the application of the techniques described for the successful exploitation of oil and gas reservoirs.

Course Objectives

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

- Apply and gain an advanced knowledge on well stimulation techniques and treatments
- Discuss the phases of formation characterization including well and reservoir testing, rock mechanics and well logs
- Explain the basics and mechanics of hydraulic fracturing
- Recognize the importance of fracturing fluid chemistry and proppants
- Perform fracture evaluation using pressure diagnostics
- Recognize the importance of fracture treatment design
- Define the various concepts of fracturing operations
- Explain thoroughly the post-treatment evaluation and evaluate fractured well performance
- Determine the basic concepts of matrix treatments
- Apply specific techniques of formation damage, including origin, diagnosis and treatment strategy
- Differentiate and discuss additives in acidizing fluids
- Analyze carbonate acidizing design
- Discuss sandstone acidizing
- Employ systematic techniques and tools in fluid placement and pumping strategy
- Evaluate Matrix Stimulation Treatment

Who Should Attend

This course covers systematic techniques and methodologies on well stimulation techniques and treatments for petroleum industry professionals who are involved in the important activities of reservoir evaluation, development and management and for those who require invaluable skills in the application of the techniques described for the successful exploitation of oil and gas reservoirs.

Course Fee

Istanbul	**US$ 8,500** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**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.

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(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:

Mr. Konstantin Zorbalas, MSc, BSc, is a **Senior Petroleum Engineer & Well Completions Specialist** with over **25 years** of **offshore** and **onshore** experience in the **Oil** & **Gas**, **Refinery** & **Petrochemical** industries. His wide expertise includes **Workovers & Completions**, **Petroleum Risk & Decision Analysis**, **Acidizing Application** in **Sandstone** & **Carbonate**, **Well Testing Analysis**, **Stimulation Operations**, **Reserves Evaluation**, **Reservoir Fluid Properties**, **Reservoir Engineering & Simulation Studies**, **Reservoir Monitoring**, **Artificial Lift Design**, **Gas Operations**, **Workover/Remedial Operations** & **Heavy Oil Technology**, **Applied Water Technology**, **Oil & Gas Production**, **X-mas Tree** & **Wellhead Operations** & **Testing**, **Artificial Lift Systems** (**Gas Lift**, **ESP**, and **Rod Pumping**), **Well Cementing**, **Production Optimization**, **Well Completion Design**, **Sand Control**, **PLT Correlation**, **Slickline Operations**, **Acid Stimulation**, **Well testing**, **Production Logging**, **Project Evaluation** & **Economic Analysis**. Further, he is actively involved in **Project Management** with special emphasis in production technology and field optimization, performing conceptual studies, economic analysis with risk assessment and field development planning. He is currently the **Senior Petroleum Engineer & Consultant** of **National Oil Company** wherein he is involved in the mega-mature fields in the Arabian Gulf, predominantly carbonate reservoirs; designing the acid stimulation treatments with post-drilling rigless operations; utilizing CT with tractors and DTS systems; and he is responsible for gas production and preparing for reservoir engineering and simulation studies, well testing activities, field and reservoir monitoring, production logging and optimization and well completion design.

During his career life, Mr. Zorbalas worked as a **Senior Production Engineer**, **Well Completion Specialist**, **Production Manager**, **Project Manager**, **Technical Manager**, **Technical Supervisor** & **Contracts Manager**, **Production Engineer**, **Production Supervisor**, **Production Technologist**, **Technical Specialist**, **Business Development Analyst**, **Field Production Engineer** and **Field Engineer**. He worked for many **world-class oil/gas companies** such as **ZADCO**, **ADMA-OPCO**, **Oilfield International Ltd**, **Burlington Resources** (later acquired by **Conoco Phillips**), **MOBIL E&P**, **Saudi Aramco**, **Pluspetrol E&P SA**, **Wintershall**, **Taylor Energy**, **Schlumberger**, **Rowan Drilling** and **Yukos EP** where he was in-charge of the **design and technical analysis** of a gas plant with capacity **1.8 billion m3/yr gas**. His achievements include **boosting oil production 17.2% per year** since 1999 using **ESP** and **Gas Lift systems**.

Mr. Zorbalas has **Master** and **Bachelor** degrees in **Petroleum Engineering** from the **Mississippi State University**, **USA**. Further, he is an **SPE Certified Petroleum Engineer**, **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), an active member of the Society of Petroleum Engineers (**SPE**) and has numerous scientific and technical publications and delivered innumerable training courses, seminars and workshops worldwide.

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 director(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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Reservoir Stimulation in Petroleum Production*** *Introduction ● Inflow Performance ● Alterations in the Near-Wellbore Zone ● Tubing Performance & NODAL* Analysis ● Decision Process for Well Stimulation ● Reservoir Engineering Considerations for Optimal Production Enhancement Strategies ● Stimulation Execution*
0930 – 0945	*Break*
0945 – 1115	***Formation Characterization: Well & Reservoir Testing*** *Evolution of a Technology ● Pressure Derivative in Well Test Diagnosis ● Parameter Estimation from Pressure Transient Data ● Test Interpretation Methodology ● Analysis with Measurement of Layer Rate ● Layered Reservoir Testing ● Testing Multilateral & Multibranch Wells ● Permeability Determination from a Fracture Injection Test*
1115 – 1245	***Formation Characterization: Rock Mechanics*** *Basic Concepts ● Rock Behavior ● Rock Mechanical Property Measurement ● State of Stress in the Earth ● In-situ Stress Management*
1245 – 1300	*Break*
1300 – 1420	***Formation Characterization: Well Logs*** *Depth ● Temperature ● Properties Related to the Diffusion of Fluids ● Properties Related to the Deformation & Fracturing of Rock ● Zoning*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Basics of Hydraulic Fracturing*** *Overview of Hydraulic Fracturing ● In-Situ Stress ● Reservoir Engineering ● Rock & Fluid Mechanics ● Treatment Pump Scheduling ● Economics & Operational Considerations*
0930 – 0945	*Break*

0945 – 1045	***Mechanics of Hydraulic Fracturing*** *History of Early Hydraulic Fracture Modeling ● Three-Dimensional & Pseudo-Three-Dimensional Models ● Leakoff ● Proppant Placement ● Heat Transfer Models ● Fracture Tip Effects ● Tortuosity & Other Near-Well Effects ● Acid Fracturing ● Multilayer Fracturing ● Pump Schedule Generation ● Pressure History Matching*
1045 – 1245	***Fracturing Fluid Chemistry & Proppants*** *Water-Base Fluids ● Oil-Base Fluids ● Acid-Based Fluids ● Multiphase Fluids ● Additives ● Proppants ● Execution*
1245 – 1300	*Break*
1300 – 1420	***Performance of Fracturing Materials*** *Fracturing Fluid Characterization ● Characterization Basics ● Translation of Field Conditions to a Laboratory Environment ● Molecular Characterization of Gelling Agents ● Rheology ● Proppant Effects ● Fluids Loss*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Fracture Evaluation Using Pressure Diagnostics*** *Fundamental Principles of Hydraulic Fracturing ● Pressure During Pumping ● Analysis During Fracture Closure ● Pressure Interpretation After Fracture Closure ● Numerical Simulation of Pressure: Combined Analysis of Pumping & Closing ● Comprehensive Calibration Test Sequence*
0930 – 0945	*Break*
0945 – 1045	***Fracture Treatment Design*** *Design Considerations ● Geometry Modeling ● Treatment Schedule ● Multilayer Fracturing ● Acid Fracturing ● Deviated Wellbore Fracturing*
1045 – 1245	***Fracturing Operations*** *Completions ● Perforating ● Surface Equipment for Fracturing Operations ● Bottomhole Pressure Measurement & Analysis ● Proppant Flowback Control ● Flowback Strategies ● Quality Assurance & Quality Control ● Health, Safety & Environment*
1245 - 1300	*Break*
1300 – 1420	***Post-Treatment Evaluation & Fractured Well Performance*** *Post-Treatment Fracture Evaluation ● Factors Affecting Fractured Well Performance ● Well Test Analysis of Vertically Fractured Wells ● Prediction of Fractured Well Performance*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Introduction to Matrix Treatments*** *Candidate Selection ● Formation Damage Characterization ● Stimulation Technique Determination ● Treatment Design ● Final Economic Evaluation ● Execution ● Treatment Evaluation*
0930 – 0945	*Break*

0945 – 1045	***Formation Damage: Origin, Diagnosis & Treatment Strategy*** *Damage Characterization ● Formation Damage Descriptions ● Origins of Formation Damage ● Laboratory Identification & Treatment Selection ● Treatment Strategies & Concerns*
1045 – 1245	***Additives in Acidizing Fluids*** *Corrosion Inhibitors ● Surfactants ● Clay Stabilizers ● Mutual Solvents ● Iron Control Additives ● Alcohols ● Acetic Acid ● Organic Dispersants ● Organic Solvents ● Diversion ● Additive Compatibility ● Facility Upsets Following Acid Stimulation*
1245 – 1300	*Break*
1300 – 1420	***Fundamentals of Acid Stimulation*** *Acid-Mineral Interactions ● Sandstone Acidizing ● Carbonate Acidizing*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Carbonate Acidizing Design*** *Rock & Damage Characteristics in Carbonate Formations ● Carbonate Acidizing with Hydrochloric Acid ● Other Formulations ● Treatment Design*
0930 – 0945	*Break*
0945 – 1045	***Sandstone Acidizing*** *Treating Fluids ● Solubility of By-Products ● Kinetics: Factors Affecting Reacting Rates ● Hydrofluoric Acid Reaction Modeling ● Other Acidizing Formulations ● Damage Removal Mechanisms ● Methods of Controlling Precipitates ● Acid Treatment Design Considerations ● Matrix Acidizing Design Guidelines ● Acid Treatment Evaluation*
1045 – 1245	***Fluid Placement & Pumping Strategy*** *Choice of Pumping Strategy ● Chemical Diverter Techniques ● Laboratory Characterization ● Foam Diversion ● Ball Sealers ● Mechanical Tools ● Horizontal Wells*
1245 – 1300	*Break*
1300 – 1345	***Matrix Stimulation Treatment Evaluation*** *Derivation of Bottomhole Parameters from Wellhead Measurements ● Monitoring Skin Effect Evolution During Treatment ● Prouvost and Economides Method ● Behenna Method ● Inverse Injectivity Diagnostic Plot ● Limitations of Matrix Treatment Evaluation Techniques ● Treatment Response Diagnosis ● Post-Treatment Evaluation*
1345 - 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of 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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