COURSE OVERVIEW DE0513
Integration of Geological, Surveillance & Well Test/Production Data

Course Title
Integration of Geological, Surveillance & Well Test/Production Data

Course Date/Venue
February 23-27, 2025/Azure or Olivine Meeting Room, Fairmont Nile City, Cairo, Egypt

Course Reference
DE0513

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

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Integration of Geological, Surveillance and Well Test/Production data. It covers the reservoir characterization, types of geological data and tools and techniques for geological data collection and interpretation; the types of surveillance data including production data, pressure monitoring and fluid sampling; the well testing and production data; the reliability and accuracy of data from various sources; and the validation of geological, surveillance and well test data.

Further, the course will also discuss the concept of data integration in reservoir management; building static reservoir models and incorporating lithological and structural data into the model; correlating stratigraphic data across wells and generating geological maps and cross-sections; integrating geological data with surveillance data; the reservoir zoning and compartmentalization; and the basics of pressure transient analysis (PTA) and its role in reservoir characterization.

During this interactive course, participants will learn the integration of temperature, fluid sampling and time-lapse (4D) seismic data; interpreting and integrating surveillance data into reservoir simulation models; the well test analysis, production data analysis and nodal analysis; the integrated asset modeling (IAM) and its application in reservoir management; the integrated data for field development planning; the machine learning and AI applications in data integration; the dynamic reservoir simulation models and techniques for managing uncertainty in integrated data; the risk management strategies in reservoir development; the integrated reservoir management (IRM) and its importance in maximizing reservoir value; and the emerging technologies and trends in data integration.

Course Objectives

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

- Apply and gain an in-depth knowledge on the integration of geological, surveillance and well test/production data
- Discuss reservoir characterization and its importance in the petroleum industry
- Identify the types of geological data as well as tools and techniques for geological data collection and interpretation
- Recognize the importance of surveillance in reservoir management and the types of surveillance data including production data, pressure monitoring and fluid sampling
- Illustrate well testing and production data and ensure the reliability and accuracy of data from various sources
- Employ techniques for validating geological, surveillance and well test data
- Explain the concept of data integration in reservoir management and identify challenges and strategies in integrating diverse data sets
- Build static reservoir models and incorporate lithological and structural data into the model
- Carryout techniques for correlating stratigraphic data across wells and generate geological maps and cross-sections
- Integrate geological data with surveillance data and identify reservoir zoning and compartmentalization
- Use industry-standard software for geological modeling and integration and employ production surveillance techniques
- Define the basics of pressure transient analysis (PTA) and its role in reservoir characterization and integrate PTA results with geological models
- Discuss the integration of temperature, fluid sampling and time-lapse (4D) seismic data
- Interpret surveillance data for decision-making and integrate surveillance data into reservoir simulation models
- Carryout well test analysis and integrate well test data with geological and surveillance data

- Recognize the production data analysis techniques and integrate production data with reservoir models
- Apply nodal analysis and system integration as well as integrated asset modeling (IAM) and its application in reservoir management
- Utilize integrated data for field development planning and recognize machine learning and AI applications in data integration as well as predict modeling using integrated data
- Identify dynamic reservoir simulation models and integrate geological, surveillance and well test data into dynamic simulations
- Employ techniques for managing uncertainty in integrated data and carryout risk management strategies in reservoir development
- Recognize integrated reservoir management (IRM) and its importance in maximizing reservoir value
- Explore emerging technologies and trends in data integration and prepare for the future of reservoir management

Who Should Attend

This course provides an overview of all significant aspects and considerations of the integration of geological, surveillance and well test/production data for engineering, geophysical and technical personnel who are in need of basic geological training including support and administrative personnel. The course is also beneficial for well-site geologists, drilling and operation engineers and other staff involved in the acquisition and use of well-site (geological) data.

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.

Accommodation

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

Course Fee

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.

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.

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:

Ms. Diana Helmy, PgDip, MSc, BSc, is a **Senior Petroleum & Geologist** with extensive years of experience within the **Oil & Gas**, **Refinery** and **Petrochemical** industries. Her expertise widely covers in the areas of **Tubular & Pipe** Handling, **Tubular Strength**, **Casing & Tubing** Design, **Production/Injection Loads** for Casing Strings & Tubing, **Drilling** Loads, **Drilling & Production Thermal** Loads, **Well** Architecture, **Wellhead Integrity**, **Well Integrity & Artificial Lift**, **Well Integrity** Management, **Well** Completion & Workover, Applied **Drilling** Practices, Horizontal **Drilling**, **Petroleum** Production, **Resource & Reserve Evaluation**, **Reserves Estimation & Uncertainty**, Methods for **Aggregation of Reserves & Resources**, **Horizontal & Multilateral Wells**, **Well Completion & Stimulation**, **Artificial Lift System Selection & Design**, **Well** Testing & Oil Well Performance, **Well** Test Design Analysis, **Well Test** Operations, **Well Testing & Perforation**, **Directional** Drilling, **Formation Damage** Evaluation & Preventive, **Formation Damage** Remediation, **Drilling & Formation Damage**, Simulation Program for The **International Petroleum Business**, **Well** Testing & Analysis, **Horizontal & Multilateral Wells & Reservoir** Concerns, **Oil & Gas Analytics**, **Petrophysics & Reservoir Engineering**, **Subsurface Geology & Logging** Interpretation, **Petroleum Geology**, **Geophysics**, **Seismic** Processing & Exploration, **Seismic** Interpretation, **Sedimentology**, **Stratigraphy & Biostratigraphy**, **Petroleum Economy**, **Core** Analysis, Well Logging Interpretation, **Core Lab Analysis** & **SCAL**, **Sedimentary Rocks**, **Rock** Types, Core & Ditch Cuttings Analysis, Clastic, Carbonate & Basement Rocks, **Stratigraphic Sequences**, **Petrographically** Analysis, Thin Section Analysis, Scanning Electron Microscope (**SEM**), X-ray Diffraction (**XRD**), Cross-Section Tomography (**CT**), **Conventional & Unconventional** Analysis, **Porosity & Permeability**, **Geological & Geophysical** Model, **Sedimentary** Facies, **Formation Damage** Studies & Analysis, **Rig** Awareness, 2D&3D **Seismic** Data Processing, Static & Dynamic Correction, Noise Attenuation & Multiple Elimination Techniques, Velocity Analysis & Modeling and various software such as Petrel, OMEGA, LINUX, Kingdom and Vista. She is currently a **Senior Consultant** wherein she is responsible in different facets of **Petroleum & Process Engineering** from managing **asset integrity**, **well integrity process**, **pre-commissioning/commissioning** and **start up** onshore & offshore process facilities.

During her career life, Ms. Diana worked as a **Reservoir Geologist**, **Seismic Engineer**, **Geology Instructor**, **Geoscience Instructor & Consultant** and **Petroleum Geology Researcher** from various international companies like the **Schlumberger**, Corex Services for Petroleum Services, Petrolia Energy Supplies and Alexandria University.

Ms. Diana has a **Postgraduate Diploma** in **Geophysics**, **Master's** degree in **Petroleum Geology** and **Geophysics** and a **Bachelor's** degree in **Geology**. Further, she is a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management** (**ILM**) and has delivered numerous trainings, courses, workshops, seminars and conferences internationally.

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: Sunday, 23rd of February 2025

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Reservoir Characterization*** *Overview of Reservoir Characterization & its Importance in the Petroleum Industry • Understanding the Integration of Geological, Surveillance & Well Test Data*
0930 – 0945	*Break*
0945 – 1045	***Basics of Geological Data in Reservoir Characterization*** *Types of Geological Data: Lithology, Stratigraphy, Structural Data • Tools & Techniques for Geological Data Collection & Interpretation*
1045 – 1145	***Surveillance Data Overview*** *Importance of Surveillance in Reservoir Management • Types of Surveillance Data: Production Data, Pressure Monitoring & Fluid Sampling*
1145 – 1230	***Well Test & Production Data Basics*** *Understanding Well Testing & its Role in Reservoir Analysis • Types of Production Data: Flow Rates, Pressure & Temperature*
1230 – 1245	*Break*
1245 – 1330	***Data Quality Control & Assurance*** *Ensuring the Reliability & Accuracy of Data from Various Sources • Techniques for Validating Geological, Surveillance & Well Test Data*
1330 – 1420	***Basics of Data Integration*** *The Concept of Data Integration in Reservoir Management • Challenges & Strategies in Integrating Diverse Data Sets*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: Monday, 24th of February 2025

0730 – 0830	***Geological Modeling Techniques*** *Building Static Reservoir Models • Incorporating Lithological & Structural Data into the Model*
0830 – 0930	***Stratigraphic Correlation & Mapping*** *Techniques for Correlating Stratigraphic Data Across Wells • Generating Geological Maps & Cross-Sections*
0930 – 0945	*Break*
0945 – 1100	***Integrating Geological Data with Surveillance Data*** *Correlating Production Data with Geological Features • Using Geological Models to Predict Fluid Movement & Pressure Behavior*
1100 – 1230S	***Reservoir Zoning & Compartmentalization*** *Identifying Reservoir Compartments & Flow Units • Impact of Geological Features on Reservoir Performance*
1230 – 1245	*Break*

1245 – 1330	***Case Study: Geological Data Integration*** *Practical Example of Integrating Geological Data in a KOC Field • Lessons Learned & Best Practices*
1330 – 1420	***Software Tools for Geological Data Integration*** *Overview of Industry-Standard Software Used for Geological Modeling & Integration*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 25th of February 2025

0730 – 0830	***Production Surveillance Techniques*** *Continuous & Periodic Production Data Monitoring • Tools & Techniques for Production Surveillance*
0830 – 0930	***Pressure Transient Analysis (PTA)*** *Basics of PTA & its Role in Reservoir Characterization • Integrating PTA Results with Geological Models*
0930 – 0945	*Break*
0945 – 1100	***Temperature & Fluid Sampling Integration*** *Role of Temperature & Fluid Sampling in Reservoir Monitoring • Integrating Fluid Properties Data into Reservoir Models*
1100 – 1230	***Time-Lapse (4D) Seismic Data Integration*** *Overview of 4D Seismic & its Application in Reservoir Monitoring • Integrating Seismic Data with Geological & Production Data*
1230 – 1245	*Break*
1245 – 1330	***Surveillance Data Interpretation for Reservoir Management*** *Techniques for Interpreting Surveillance Data for Decision-Making • Integrating Surveillance Data into Reservoir Simulation Models*
1330 – 1420	***Case Study: Surveillance Data Integration*** *Practical Example of Using Surveillance Data in a KOC Field • Best Practices & Lessons Learned*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 26th of February 2025

0730 – 0830	***Well Test Analysis & Interpretation*** *Fundamentals of Well Test Analysis • Integrating Well Test Data with Geological & Surveillance Data*
0830 – 0930	***Production Data Analysis Techniques*** *Methods for Analyzing Production Decline Curves & Production History • Integrating Production Data with Reservoir Models*
0930 – 0945	*Break*
0945 – 1100	***Nodal Analysis & System Integration*** *Overview of Nodal Analysis for Production Optimization • Integrating Nodal Analysis with Well Test & Production Data*
1100 – 1230S	***Integrated Asset Modeling (IAM)*** *Introduction to IAM & its Application in Reservoir Management • Combining Geological, Surveillance & Well Test Data in IAM*
1230 – 1245	*Break*

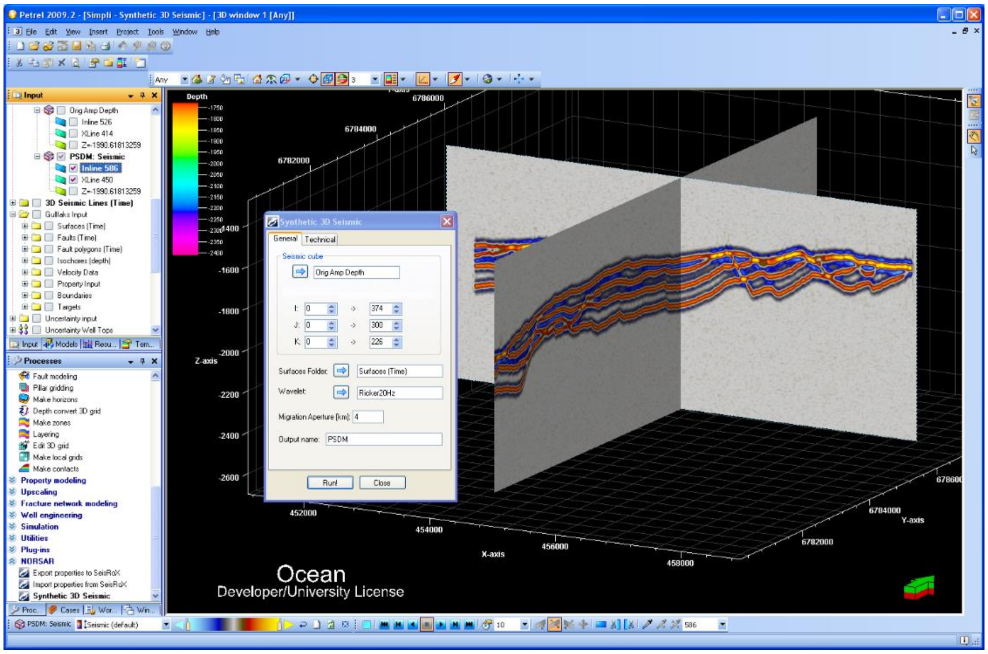
1245 – 1330	***Field Development Planning Using Integrated Data*** *Utilizing Integrated Data for Field Development Planning • Case Examples from KOC Fields*
1330 – 1420	***Case Study: Well Test & Production Data Integration*** *Practical Example of Integrating Well Test Data in a KOC Field • Lessons Learned & Best Practices*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: **Thursday, 27th of February 2025**

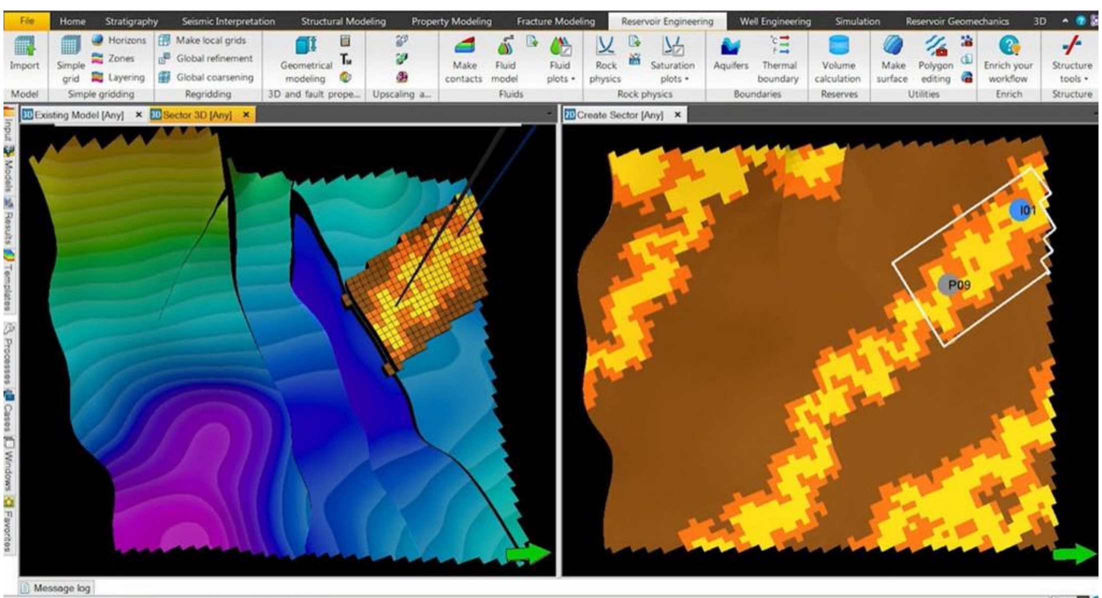
0730 – 0830	***Other Data Integration Techniques*** *Machine Learning & AI Applications in Data Integration • Predictive Modeling Using Integrated Data*
0830 – 0930	***Dynamic Reservoir Simulation*** *Introduction to Dynamic Reservoir Simulation Models • Integrating Geological, Surveillance & Well Test Data into Dynamic Simulations*
0930 – 0945	*Break*
0945 – 1100	***Uncertainty Quantification & Risk Management*** *Techniques for Managing Uncertainty in Integrated Data • Risk Management Strategies in Reservoir Development*
1100 – 1215	***Integrated Reservoir Management (IRM)*** *Overview of IRM & its Importance in Maximizing Reservoir Value • Case Examples of Successful Irm Implementations*
1215 – 1230	*Break*
1230 – 1310	***Workshop: Practical Integration Exercise*** *Hands-On Session Integrating Geological, Surveillance & Well Test Data for a K(* *Group Discussions & Presentations*
1310 - 1345	***Future Trends in Data Integration*** *Emerging Technologies & Trends in Data Integration • Preparing for the Future of Reservoir Management in KOC*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the “Petrel Software”, “Eclipse Software”, “Three-Phase Black-Oil Reservoir Simulator”, PipeSim”, “AutoPIPE”, “Pipe Flow Expert”, “ECRIN” and “PROSPER” software’s.



Petrel Software



Eclipse Software

PRODUCT OVERVIEW

THREE-PHASE, BLACK-OIL RESERVOIR SIMULATOR

BENEFITS

- Achieve simulation results faster than any other black oil simulator
- Ability to quickly screen a variety of recovery mechanisms before moving to more complex simulations
- Accurate modelling of the matrix-fracture transfer in fractured reservoirs
- Use the speed of IMEX to model shale gas adsorption effects
- Fast and easy transition to EOR process modelling in GEM™ and STARS™
- Seamlessly interfaces with CMOST™ to facilitate rapid history matching and optimization of reservoir management workflows

IMEX™, one of the world's fastest conventional black oil reservoir simulators, is used to obtain history-matches and forecasts of primary, secondary and enhanced or improved oil recovery processes. In addition, IMEX models complex, heterogeneous, faulted oil and gas reservoirs, using millions of grid blocks, to achieve the most reliable predictions and forecasts. Use IMEX for screening prospects, setting up pilot designs, monitoring and optimizing field operations and improving production performance.

IMEX is used extensively for modelling:

- **Conventional Black Oil Reservoirs** (naturally and hydraulically fractured reservoirs)
- **Unconventional Oil and Gas Reservoirs** (naturally and hydraulically fractured reservoirs, shale oil, shale gas and tight oil and gas, gas condensate/volatile oil)
- **Improved Oil Recovery**
- **Surface Network Modelling**

Regardless of the size or the complexity of the reservoir, IMEX is an effective tool for a broad range of reservoir management issues.

CONVENTIONAL RESERVOIRS

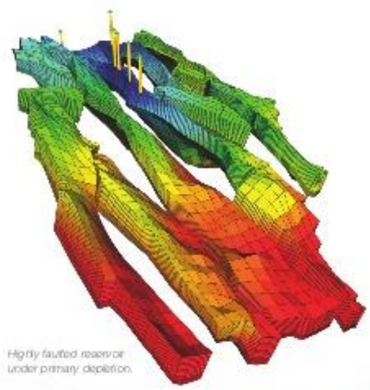
IMEX produces the fastest conventional reservoir simulation results in comparison to other simulation software. Users are able to use either the default implicit/explicit method or fully implicit method for faster calculations and to minimize run times without sacrificing accuracy. IMEX models complex, heterogeneous, faulted oil and gas reservoirs, using millions of grid blocks, to achieve the most reliable predictions and forecasts.

As a full-featured three-phase, four-component black oil simulator, IMEX also includes local grid refinement (LGR), comprehensive well management, dual porosity/permeability, flexible grids, advanced wellbore modelling to surface, mixed wettability initialization, gas adsorption and many more.

UNCONVENTIONAL OIL & GAS RESERVOIRS

Unconventional reservoirs, such as shale gas, shale liquids and tight oil and gas reservoirs typically require long horizontal wells with multi-stage hydraulic fractures. IMEX models naturally or hydraulically fractured reservoirs to accurately model the transient flow behavior allowing engineers to better forecast reservoir production. Detailed hydraulic fracture response under multi-phase non-Darcy flow conditions and the stimulated areas of shale and other tight reservoirs, are all easily analysed.

Use Builder's new workflow to import and interpret data files generated by GOHFER[1], a third-party multi-disciplinary, integrated geomechanical fracture simulator. With GOHFER data, Builder is able to create hydraulic fractures using the average heel-tip gradient option. Users will achieve better history matching and more accurate forecasting results by using simulated fractures to estimate fracture properties. In addition, users can also import microseismic data into Builder to more precisely model fracture extension and stimulated reservoir volume.



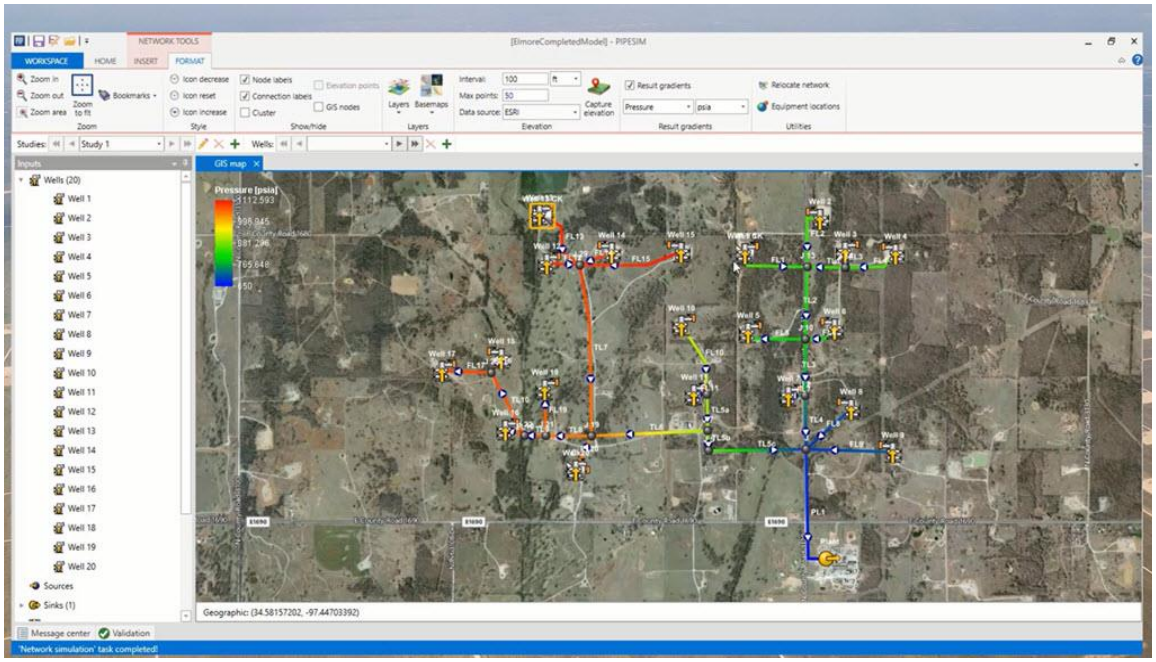
Highly faulted reservoir under primary depletion.

Another important consideration in unconventional reservoirs is gas adsorption. IMEX can model the adsorption effects in shale and Coal Bed Methane (CBM) reservoirs. In North America, more than 90 oil and gas companies have chosen CMG to simulate their unconventional oil and gas reservoirs.

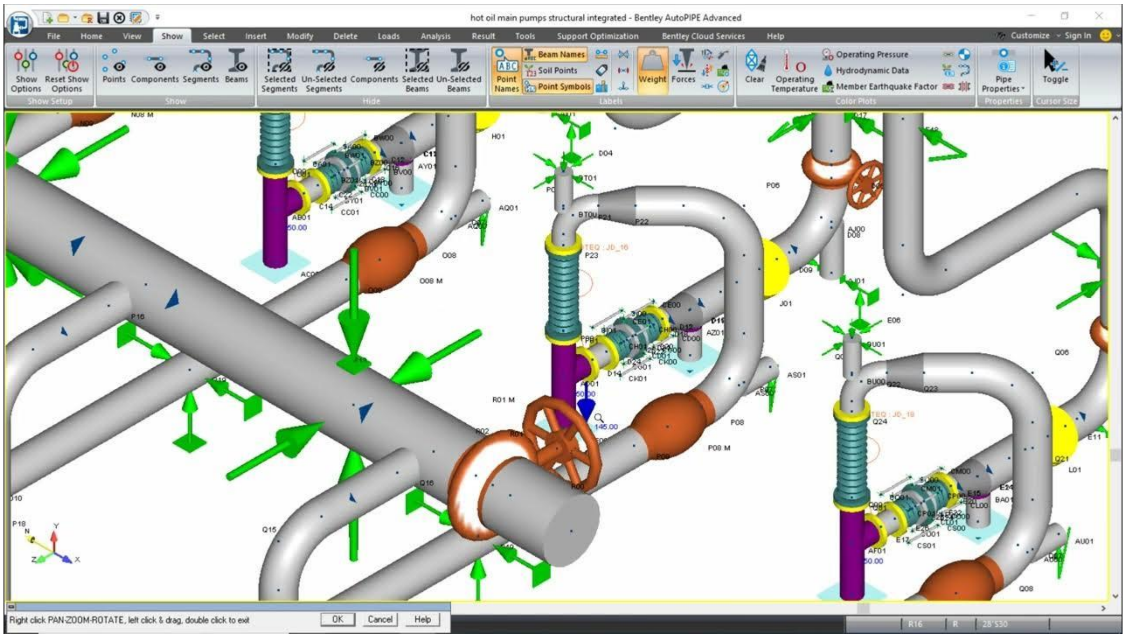
www.cmgl.ca

COMPUTER MODELLING GROUP LTD.

Three-Phase Black-Oil Reservoir Simulator

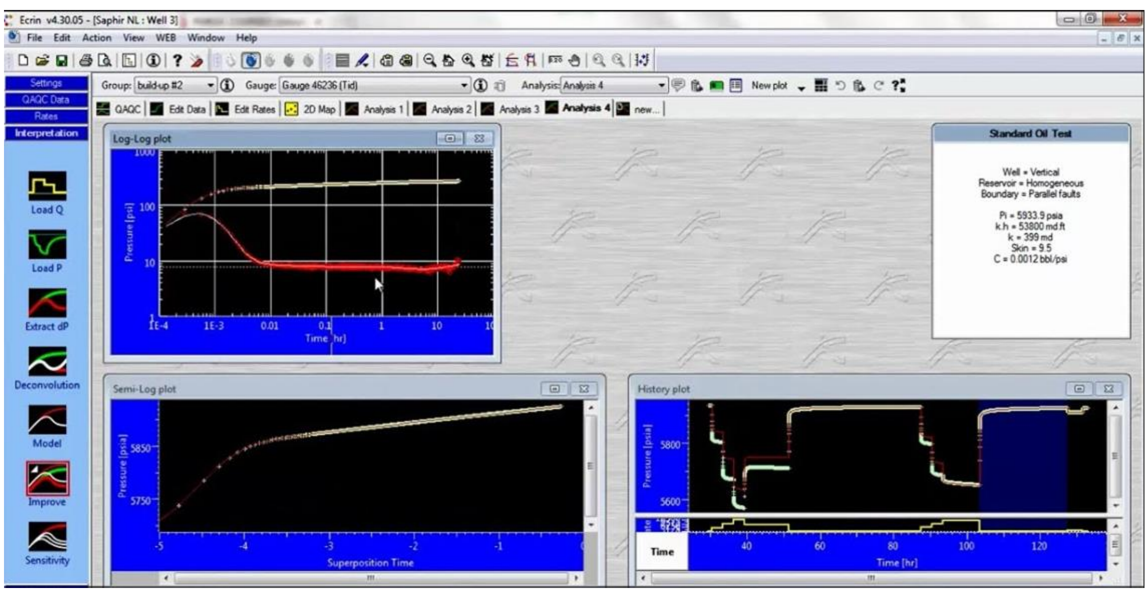


PipeSim

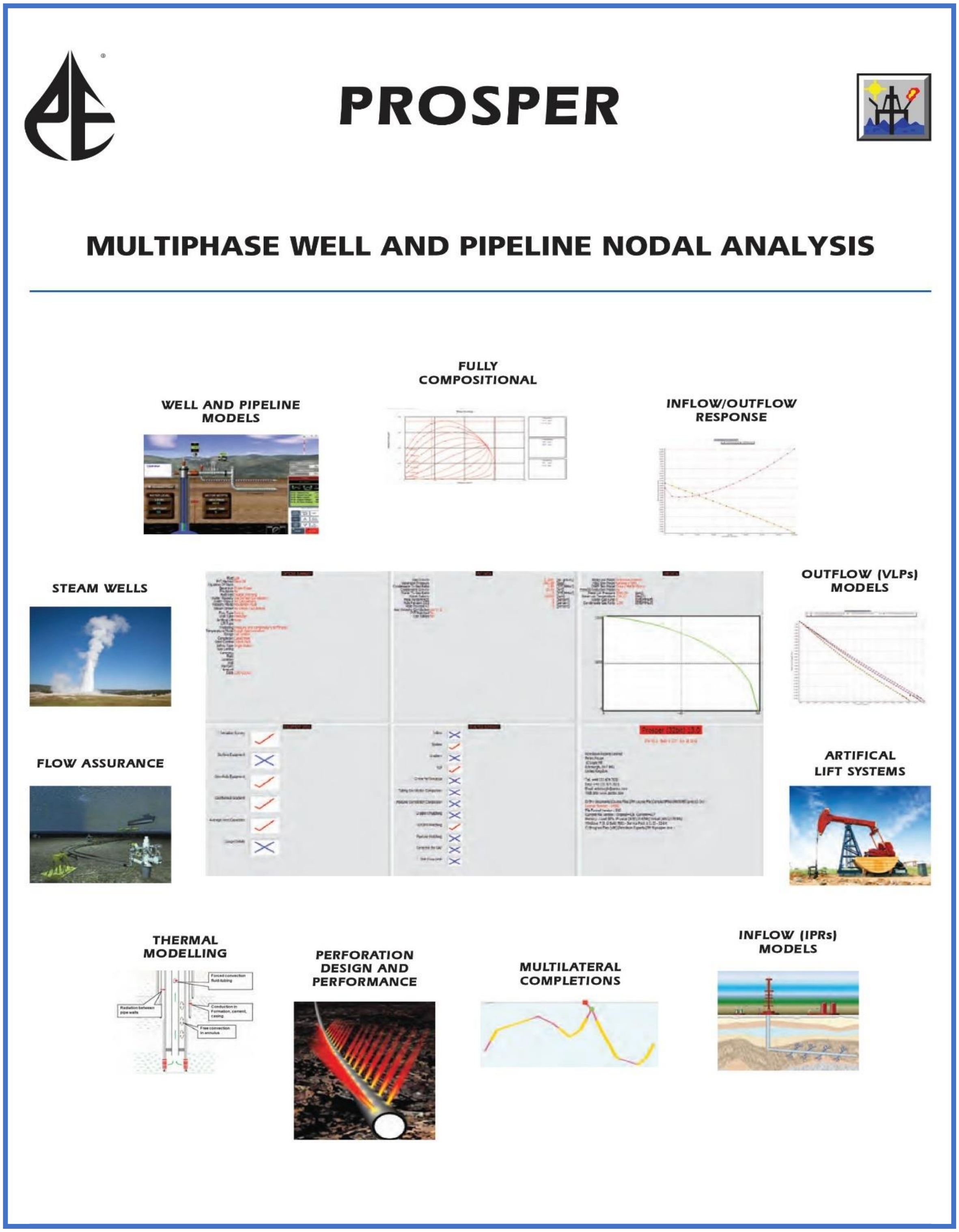


AutoPIPE

Pipe Flow Expert



ECRIN Software



<u>**Course Coordinator**</u>
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