COURSE OVERVIEW DE0622-3D
QA/QC of a Reservoir Simulation Model

Course Title
QA/QC of a Reservoir Simulation Model

Course Date/Venue
August 03-05, 2026/Online Virtual Training

Course Reference
DE0622-3D

Course Duration/Credits
Three days/1.65 CEUs/16.5 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 QA/QC of a Reservoir Simulation Model. It covers the reservoir simulation and QA/QC concepts including reservoir data types and sources; the data quality control procedures, geological model QA/QC, fluid model QA/QC and rock-fluid interaction QA/QC; the initial conditions setup, contacts validation, hydrostatic equilibrium checks and volumetric consistency; the well location and trajectory verification, completion and perforation checks, production/injection data validation and well constraints and controls; and the history matching QA/QC, numerical simulation checks and boundary conditions QA/QC.

During this interactive course, participants will learn the sensitivity analysis, forecast model QA/QC and model calibration and validation; the sources of uncertainty in models, probabilistic approaches, monte carlo simulations basics and decision-making under uncertainty; the QA/QC checklists and procedures, documentation standards, version control, model tracking, audit trails and traceability; the common errors and troubleshooting, QA/QC reports and visualization results; and communicating uncertainties to stakeholders and best practices for reporting standards.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on QA/QC of a reservoir simulation model
- Discuss reservoir simulation and QA/QC concepts including reservoir data types and sources
- Carryout data quality control procedures covering data validation techniques, consistency checks across datasets, handling missing and inconsistent data and data filtering and preprocessing
- Describe geological model QA/QC, fluid model QA/QC and rock-fluid interaction QA/QC
- Apply initial conditions setup, contacts validation, hydrostatic equilibrium checks and volumetric consistency
- Carryout well location and trajectory verification, completion and perforation checks, production/injection data validation and well constraints and controls
- Apply history matching QA/QC, numerical simulation checks and boundary conditions QA/QC
- Illustrate sensitivity analysis, forecast model QA/QC and model calibration and validation
- Identify the sources of uncertainty in models and apply probabilistic approaches, monte carlo simulations basics and decision-making under uncertainty
- Implement QA/QC checklists and procedures, documentation standards, version control and model tracking and audit trails and traceability
- Identify the common errors and troubleshooting, prepare QA/QC reports and apply visualization results, communicating uncertainties to stakeholders and best practices for reporting standards

Who Should Attend

This course provides an overview of all significant aspects and considerations of QA/QC of a reservoir simulation model for reservoir engineering professionals, geoscience professionals, simulation and modeling specialists, production and operations engineers, QA/QC and technical assurance roles, project and asset management, software and digital professionals and other technical staff.

Course Fee

US$ 2,625 per Delegate + **VAT**.

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

Haward's certificates are accredited by the following international accreditation organizations:

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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 **1.65 CEUs** (Continuing Education Units) or **16.5 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.

Course Instructor

This course will be conducted by the following instructor(s). However, we have the right to 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. Stan Constantino, MSc, BSc, is a **Senior Petroleum & Reservoir Engineer** with over **30 years** of **Offshore & Onshore** extensive experience within the **Oil, Gas & Petroleum** industries**.** His area of expertise include **Reserves & Resources**, **Reserves Estimation & Uncertainty**, **Reservoir** Characterization, **Unconventional Resource & Reserves** Evaluation, **Oil & Gas Reserves** Estimation, Methods for **Aggregation of Reserves & Resources**, **Fractured Reservoir** Classification & Evaluation, **Sequence Stratigraphy**, **Petrophysics & Rock** Properties, **Seismic** Technology, **Geological** Modelling, **Water Saturation**, **Crude Oil & Natural Gas** Demand, **Exploration Agreements & Financial** Modelling, **Seismic Survey** Evaluation, **Exploration Well** Identification, **Field Production** Operation, **Field Development** Evaluation, Crude Oil Marketing, **Core & Log Data** Integration, **Core Logging**, Advanced **Core & Log Integration**, **Well Logs & Core Analysis**, Advanced Petrophysics/Interpretation of **Cased Hole Logs**, **Cased Hole Formation Evaluation**, **Cased Hole Formation** Evaluation, **Cased Hole Evaluation**, **Cased-Hole Logging**, Applied **Production Logging & Cased Hole & Production Log** Evaluation, **Cased Hole Logging & Formation** Evaluation, Open & Cased Hole Logging, Screening of Oil Reservoirs for **Enhanced Oil Recovery**, **Enhanced Oil Recovery**, **Enhanced Oil Recovery** Techniques, **Petroleum Economic** Analysis, **Oil Industry** Orientation, **Oil Production & Refining**, **Crude Oil Market**, **Global Oil Supply & Demand**, **Global Oil Reserves**, **Crude Oil** Types & Specifications, **Oil Processing**, **Oil Transportation-Methods**, **Oil & Gas** Exploration and Methods, **Oil & Gas** Extraction, Technology Usage in Industrial Security; **Upstream**, **Midstream** & **Downstream Operations**; **Oil Reservoir** Evaluation & Estimation, **Oil Supply & Demand**, **Oil Contracts**, **Government Legislation & Oil Contractual Agreements**, **Oil Projects** & Their Feasibility (revenue and profitability), **Water Flooding**, **Reservoir** Souring & Water Breakthrough, **Reservoir Performance** Using Classical Methods, **Fractured Reservoir** Evaluation & Management, **Reservoir Surveillance** & Management, **Reservoir Engineering** & Simulation, **Reservoir Monitoring**, **Pressure Transient** Testing & **Reservoir** Performance Evaluation, **Reservoir** Characterization, **Reservoir** Engineering Applications with ESP and Heavy Oil, **Reservoir** Volumetrics, Water Drive Reservoir, **Reserve** Evaluation, Rock & Fluid Properties, Fluid Flow Mechanics, PVT Analysis, Material Balance, Darcy's Law & Applications, Radial Flow, **Gas Well** Testing, Natural Water Influx, EOR Methods, Directional Drilling, **Drilling** Production & Operations, Field Development & Production of Oil & Gas, **Wireline Logging**, **Mud Logging**, **Cased Hole Logging**, **Production Logging**, **Slick Line**, **Coil Tubing**, Exploration Wells Evaluation, **Horizontal Wells**, **Well Surveillance**, **Well Testing**, **Design & Analysis**, **Well Testing & Oil Well Performance**, **Well Log Interpretation** (**WLI**), **Formation Evaluation**, **Well Workover Supervision**, **Pressure Transient Analysis** and **Petrophysical Log Analysis**. Currently, he is the **CEO** & **Managing Director** of **Geo Resources Technology** wherein he is responsible in managing the services and providing technical supports to underground energy related projects concerning **field development**, **production**, **drilling**, **reservoir engineering** and **simulation**.

Throughout his long career life, Mr. Stan has worked for many international companies such as the **Kavala Oil**, **North Aegean Petroleum Company** and **Texaco Inc.**, as the **Managing Director**, **Operations Manager**, **Technical Trainer**, **Training Consultant**, **Petroleum Engineering & Exploration Department Head**, **Assistant Chief Petroleum Engineer**, **Reservoir Engineer, Resident Petroleum Engineer**, **Senior Petroleum Engineer** and **Petroleum Engineer** wherein he has been managing the evaluation of exploration wells, reservoir simulation, development training, production monitoring, wireline logging and well testing including selection and field application of well completion methods.

Mr. Stan has a **Master's** degree in **Petroleum Engineering** and a **Bachelor's** degree in **Geology** from the **New Mexico Institute of Mining & Technology** (**USA**) and from the **Aristotelian University** (**Greece**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership of Management (ILM**) and a member of the Society of Petroleum Engineers, USA (**SPE**), Society of Well Log Professional Analysts, USA (**SPWLA**) and European Association of Petroleum Geoscientists & Engineers (**EAGE**). Moreover, Mr. Stan published numerous scientific and technical papers and delivered various trainings, courses and workshops worldwide.

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 6 hours per day starting at 0800 and ending at 1400
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

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday, 03rd of August 2026***

0800 – 0815	*Registration & Coffee*
0815 – 0830	*Welcome & Introduction*
0830 – 0845	***PRE-TEST***
0845 – 0930	***Introduction to Reservoir Simulation & QA/QC Concepts*** *Definition and Purpose of Reservoir Simulation • Role of Simulation in Field Development Planning • Importance of QA/QC in Simulation Workflows • Overview of Common Modeling Errors*
0930 – 0945	*Break*
0945 - 1115	***Reservoir Data Types & Sources*** *Static versus Dynamic Data • Geological, Petrophysical and Fluid Data • Well and Production Data Sources • Data Uncertainty and Reliability*
1115 – 1145	***Data Quality Control Procedures*** *Data Validation Techniques • Consistency Checks Across Datasets • Handling Missing and Inconsistent Data • Data Filtering and Preprocessing*
1145 – 1200	***Geological Model QA/QC*** *Grid Design and Resolution Checks • Structural Framework Validation • Property Distribution Verification (Porosity, Permeability) • Upscaling and its Impact on Quality*
1200 - 1215	*Break*
1215 - 1300	***Fluid Model QA/QC*** *PVT Data Validation • Equation of State (EOS) Checks • Fluid Property Consistency (Viscosity, Density) • Laboratory Data Integration*
1300 - 1350	***Rock-Fluid Interaction QA/QC*** *Relative Permeability Curves Validation • Capillary Pressure Data Checks • Saturation Functions Consistency • Sensitivity of Rock-Fluid Properties*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*End of Day One*

Day 2: ***Tuesday, 04th of August 2026***

0800 - 0845	***Initialization QA/QC*** *Initial Conditions Setup (Pressure, Saturation) • Contacts Validation (GOC, OWC) • Hydrostatic Equilibrium Checks • Volumetric Consistency*
0845 - 0930	***Well Data QA/QC*** *Well Location and Trajectory Verification • Completion and Perforation Checks • Production and Injection Data Validation • Well Constraints and Controls*
0930 - 0945	*Break*
0945 – 1100	***History Matching QA/QC*** *Matching Objectives and Targets • Data Weighting and Error Metrics • Identifying Overfitting and Bias • Parameter Adjustment Strategies*
1100 – 1200	***Numerical Simulation Checks*** *Grid Convergence Testing • Time Step Control and Stability • Solver Settings and Convergence Criteria • Mass Balance Verification*

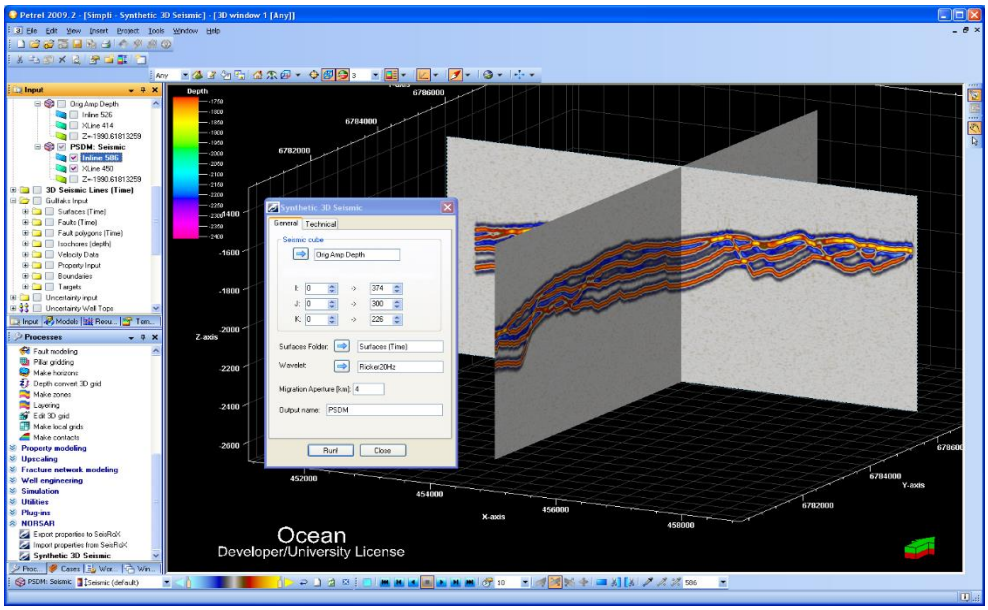
1200 - 1215	*Break*
1215 - 1300	***Boundary Conditions QA/QC*** *Aquifer Modeling Checks • Boundary Type Selection (Closed/Open) • Edge Effects and Model Limits • External Support Validation*
1300 - 1350	***Sensitivity Analysis*** *Key Uncertain Parameters Identification • Design of Simulation Cases • Interpreting Sensitivity Results • Ranking Influential Variables*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*End of Day Two*

Day 3: ***Wednesday, 05th of August 2026***

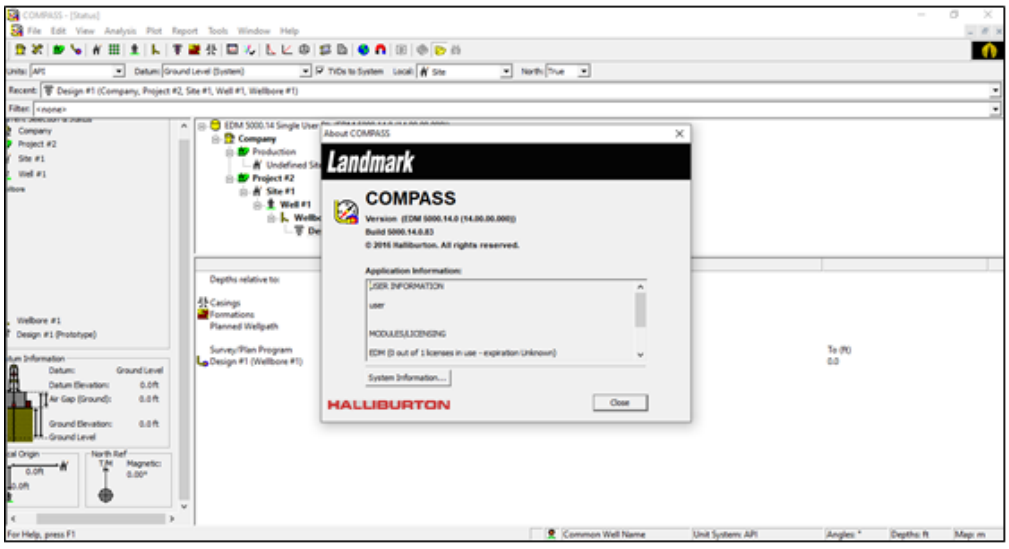
0800 - 0845	***Forecast Model QA/QC*** *Production Forecast Validation • Scenario Definition and Consistency • Uncertainty in Predictions • Comparison with Analog Fields*
0845 - 0930	***Model Calibration & Validation*** *Cross-Validation Techniques • Blind Test Datasets • Model Robustness Checks • Performance Indicators*
0930 - 0945	*Break*
0945 – 1100	***Uncertainty & Risk Assessment*** *Sources of Uncertainty in Models • Probabilistic Approaches (P10, P50, P90) • Monte Carlo Simulations Basics • Decision-Making under Uncertainty*
1100 – 1200	***QA/QC Workflow Standardization*** *QA/QC Checklists and Procedures • Documentation Standards • Version Control and Model Tracking • Audit Trails and Traceability*
1200 - 1215	*Break*
1215 - 1245	***Common Errors & Troubleshooting*** *Typical Simulation Pitfalls • Diagnosing Non-Converging Models • Identifying Unrealistic Outputs • Practical Troubleshooting Workflow*
1245 – 1330	***Reporting & Communication of QA/QC Results*** *Preparing QA/QC Reports • Visualization of Results (Plots, Maps) • Communicating Uncertainties to Stakeholders • Best Practices for Reporting Standards*
1330 – 1345	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1345 – 1400	***POST-TEST***
1400	*End of Course*

Simulator (Hands-on Practical Sessions)

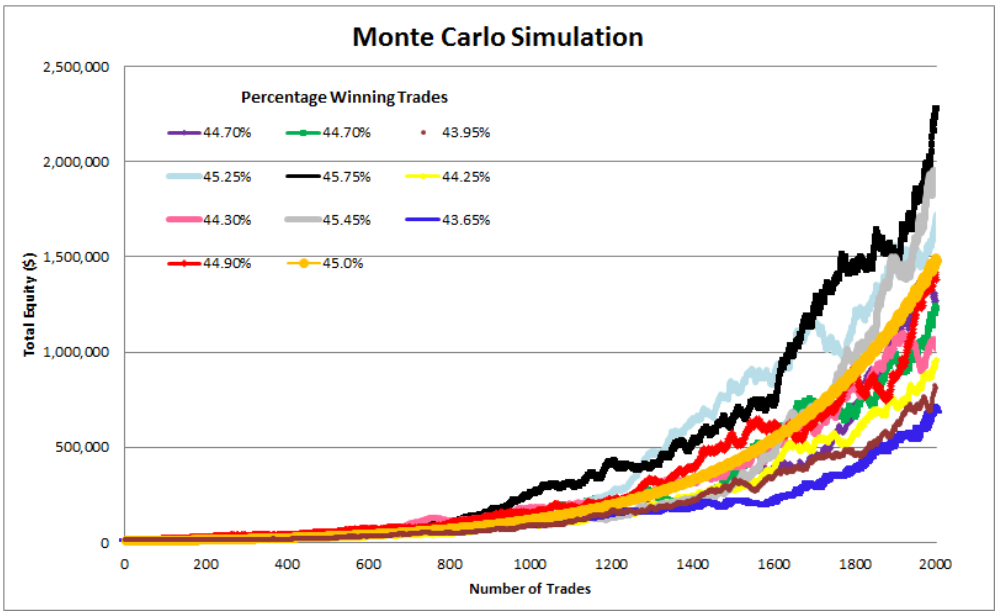
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Petrel Software", "COMPASS", "Monte Carlo", "Interactive Petrophysics (IP)", "ECRIN", "PIPESIM", "Eclipse Software", "Three-Phase Black-Oil Reservoir Simulator", "PVTsim Software", "PETEX IPM Suite" software's and "*CEMPRO + Integrated Cementing*".



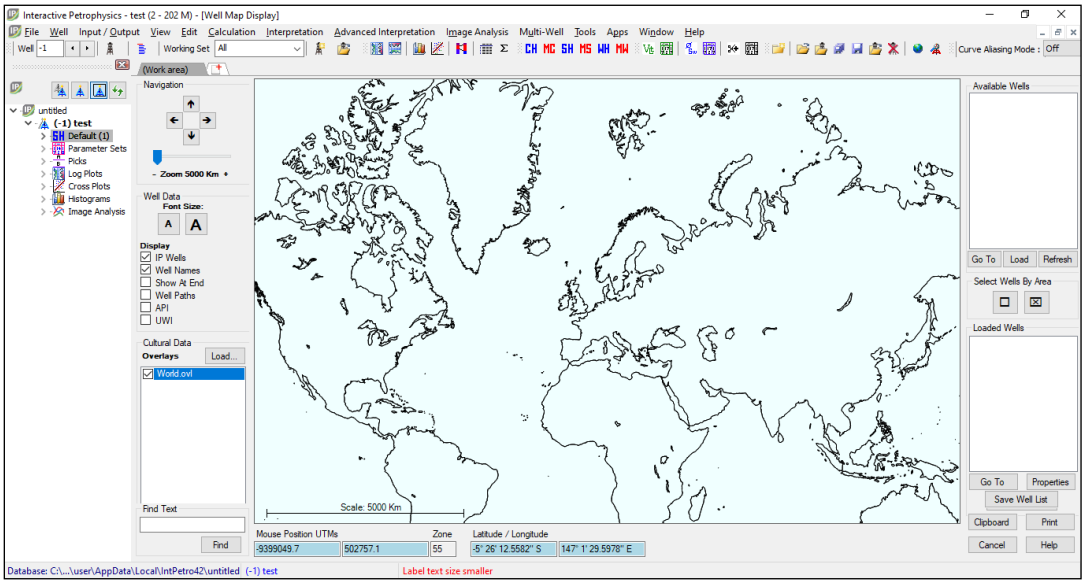
Petrel Software



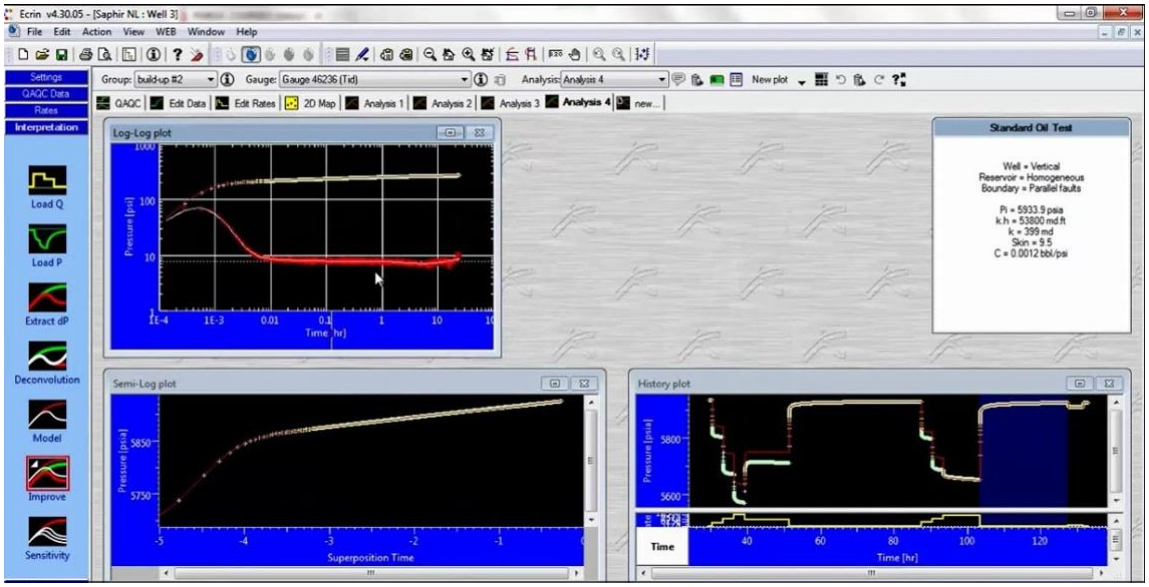
COMPASS



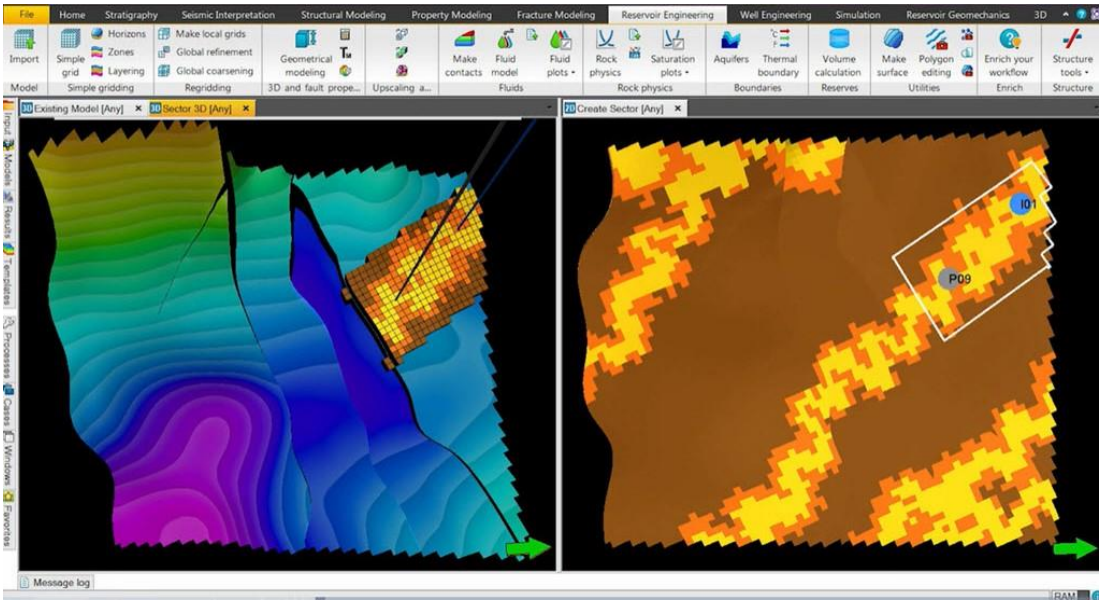
Monte Carlo Simulation



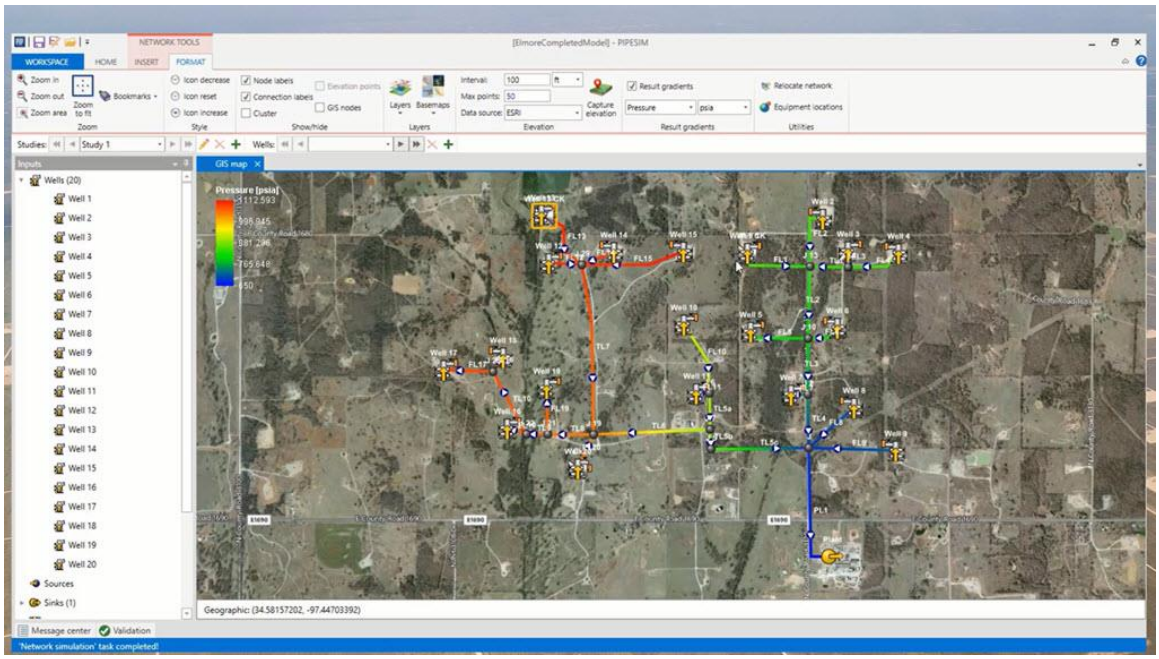
Interactive Petrophysics (IP) Software



ECRIN Software



Eclipse Software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NETWORK TOOLS
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INSERT
FORMAT
GIS map
Pressure [psia]
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Well 4
Well 5
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Well 18
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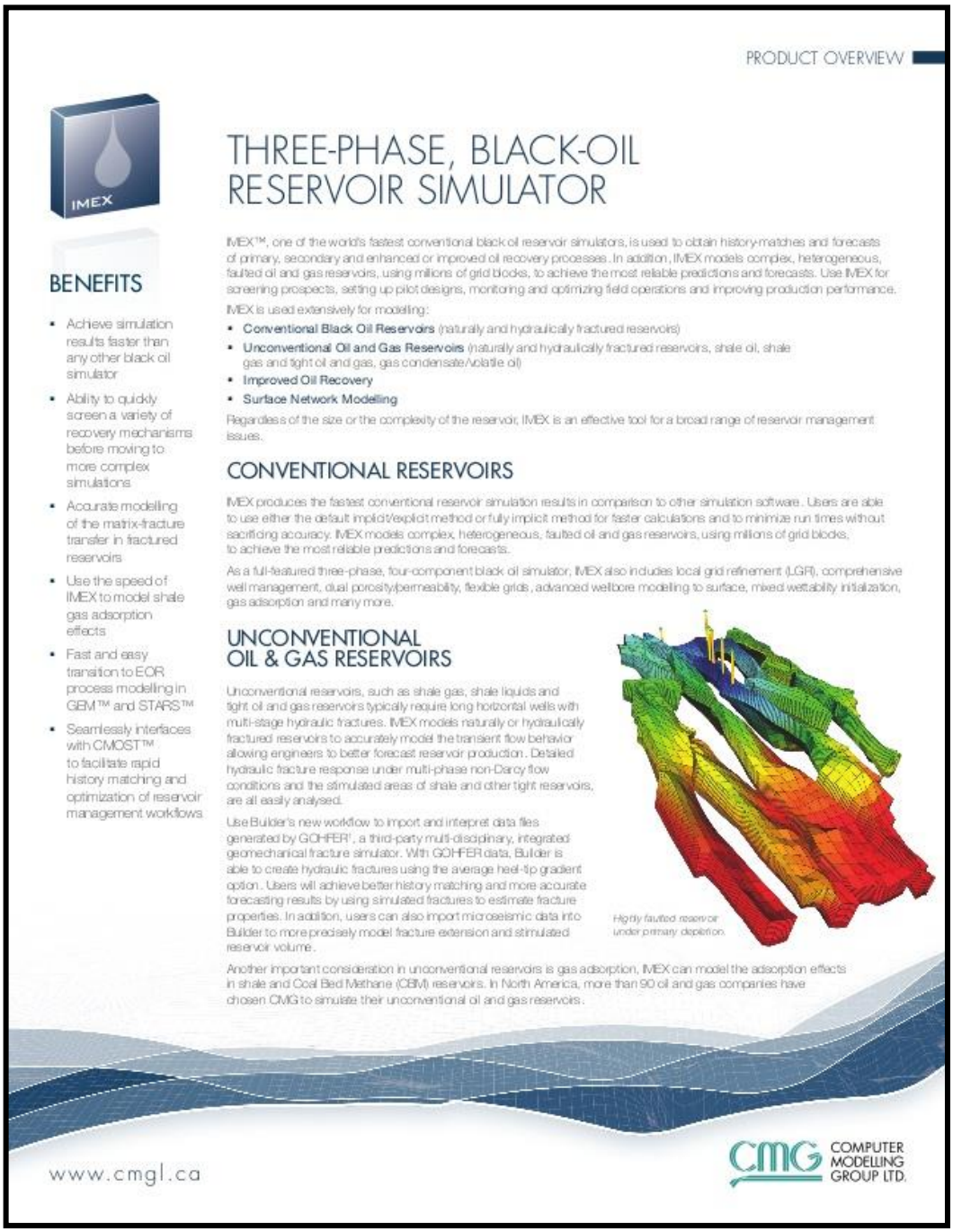
PIPESIM



PRODUCT OVERVIEW

IMEX

THREE-PHASE, BLACK-OIL RESERVOIR SIMULATOR

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.

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

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®, 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.

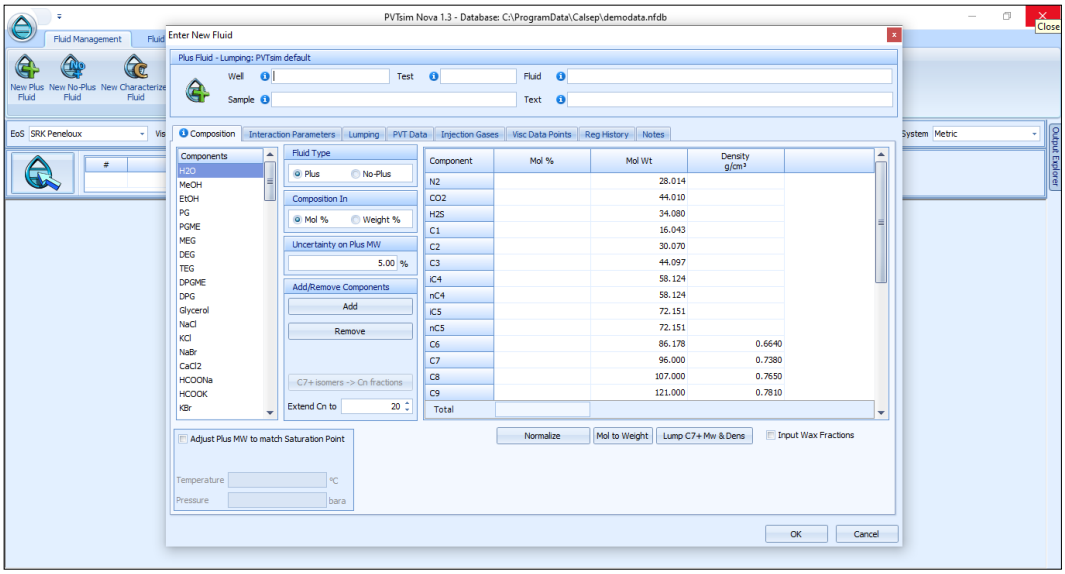
Highly faulted reservoir under primary depletion.

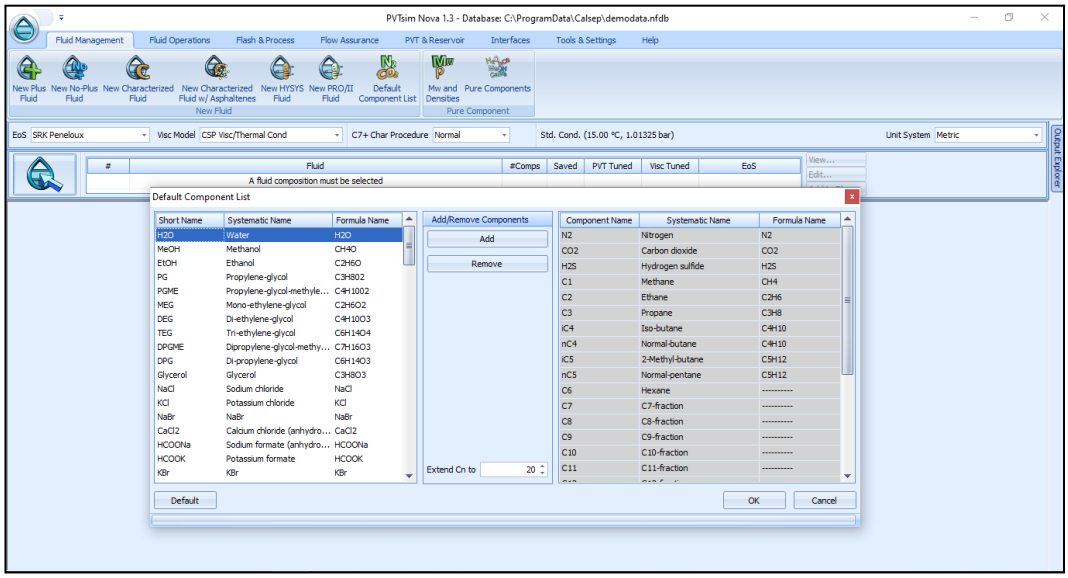
Another important consideration in unconventional reservoirs is gas adsorption. IMEX can model the adsorption effects in shale and Coal Bed Methane (CBM) reservoirs. In North America, more than 90 oil and gas companies have chosen CMG to simulate their unconventional oil and gas reservoirs.

www.cmgl.ca

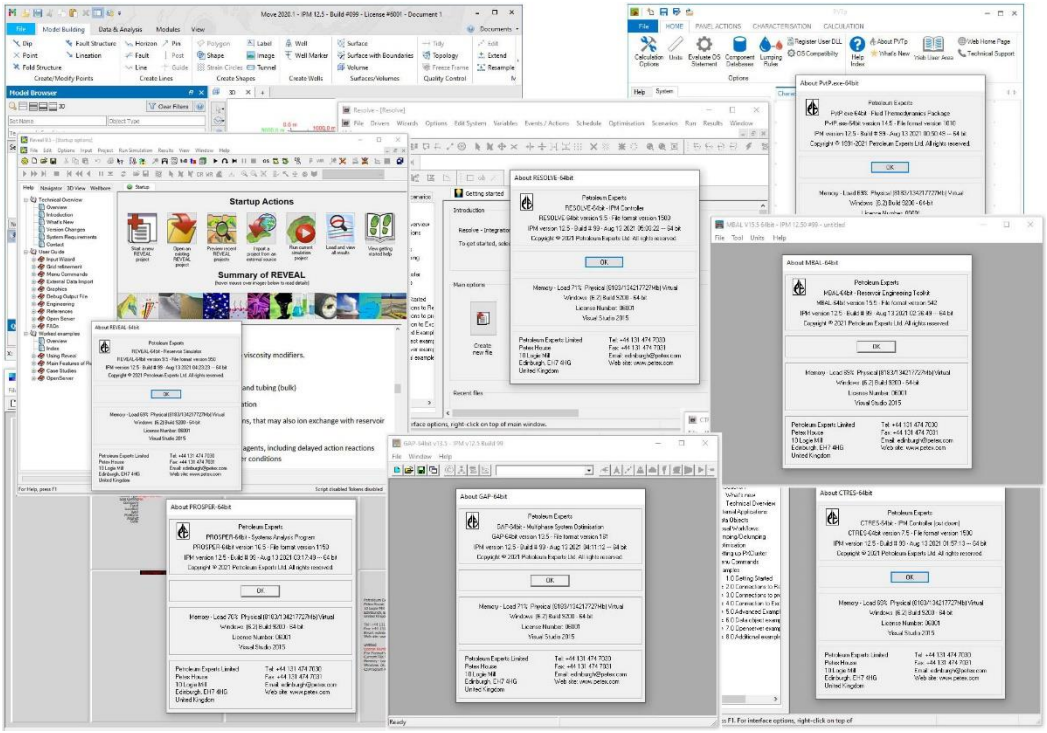
CMG COMPUTER MODELLING GROUP LTD.

Three-Phase Black-Oil Reservoir Simulator

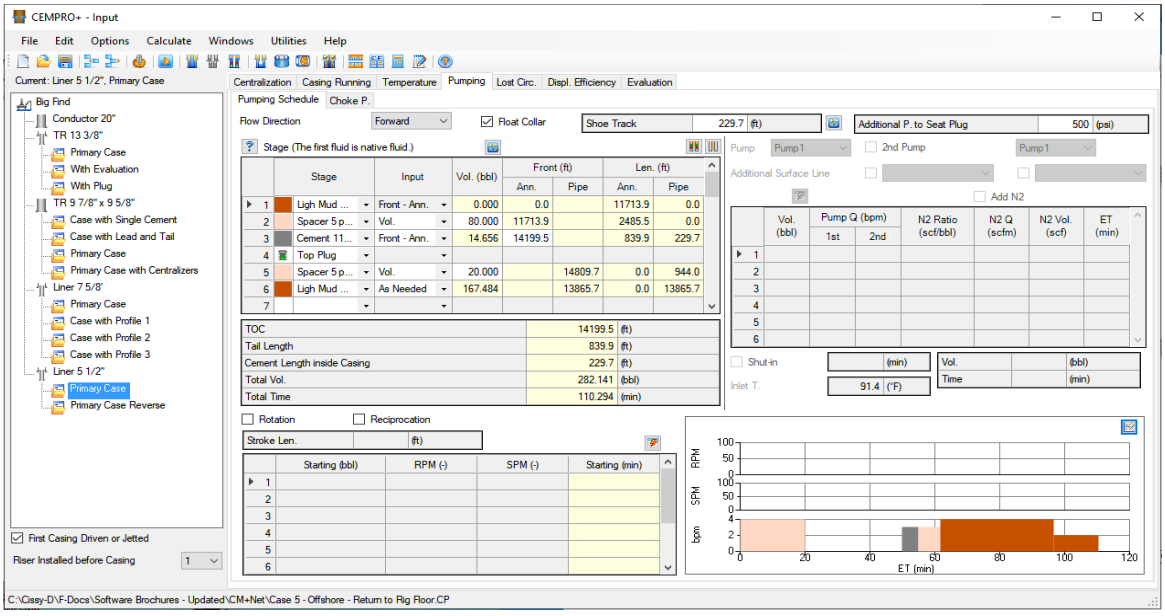




PVTsim Software



PETEX IPM Suite



CEMPRO+ Integrated Cementing Software

Course Coordinator
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