COURSE OVERVIEW DE1075
IPM (Integrated Production Modelling)

Course Title
IPM (Integrated Production Modelling)

Course Date/Venue
October 11-15, 2026/Meeting Plus 9, City Centre Rotana, Doha, Qatar

3.0 CEUs (30 PDHs) AWARD

Course Reference
DE1075

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 Integrated Production Modelling. It covers the integrated production system and its importance in field development; the components of the production system including data integration and workflow optimization; the PROSPER software, wellbore pressure losses, PVT analysis in PROSPER and vertical lift performance (VLP) correlations; the inflow performance models, skin effect and gravel pack design; the principles of gas lift operation and electric submersible pumps (ESP); the selection criteria for artificial lift methods and economic considerations in lift selection; and the monitoring and performance evaluation.

Further, the course will also discuss the MBAL software and types of aquifer models; the history matching techniques and setting up prediction scenarios; incorporating VLP and IPR data from PROSPER, operational constraints and forecasting results analysis; modelling complex reservoir systems, handling multiple PVT regions and integrating strategies in MBAL; the GAP software and surface network modelling; building surface network models, generating and interpreting performance curves and analyzing system bottlenecks; and optimizing network performance and exporting data for further analysis.

During this interactive course, participants will learn the well test data and allocating production to individual wells; handling measurement uncertainties and reporting and visualization tools; the constraints at various network levels and optimizing gas lift allocation; analyzing scenario for field development and integrated modelling concepts; and the field development planning, artificial lift impact analysis, optimization strategies and forecasting and uncertainty management.

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 integrated production modelling
- Discuss the integrated production system and its importance in field development
- Identify the components of the production system including data integration and workflow optimization
- Discuss PROSPER software, wellbore pressure losses, PVT analysis in PROSPER and vertical lift performance (VLP) correlations
- Explain inflow performance models, skin effect and gravel pack design
- Identify the principles of gas lift operation and electric submersible pumps (ESP)
- Apply selection criteria for artificial lift methods, economic considerations in lift selection and monitoring and performance evaluation
- Discuss MBAL software and types of aquifer models
- Apply history matching techniques, setting up prediction scenarios, incorporating VLP and IPR data from PROSPER, operational constraints and forecast results analysis
- Model complex reservoir systems, handle multiple PVT regions and integrate strategies in MBAL
- Discuss GAP software and surface network modelling and illustrate building surface network models
- Generate and interpret performance curves, analyze system bottlenecks, optimize network performance and export data for further analysis
- Incorporate well test data, allocate production to individual wells, handle measurement uncertainties and apply reporting and visualization tools
- Apply constraints at various network levels, optimize gas lift allocation and analyze scenario for field development
- Discuss integrated modelling concepts and apply field development planning, artificial lift impact analysis, optimization strategies and forecasting and uncertainty management

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of integrated production modelling for petroleum engineers, reservoir engineers, production engineers and for those that have recently started working in the production domain and need to become familiar with production tools/analysis, attended the course already some time ago, and require a refresher, or unrelated disciplines trying to understand the production context (e.g. accountants, project managers, etc.).

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 Fee

US$ 8,500 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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 **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.

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:

(1) Dr. Chris Kapetan, PhD, MSc, is a **Senior Drilling & Petroleum Engineer** with over **30 years** of international experience within the **Onshore** and **Offshore Oil & Gas** industry. His wide experience covers **Horizontal & Multilateral Wells**, **Well Completion & Stimulation**, **Artificial Lift System Selection & Design**, **Drilling Practices**, **Drilling Fluids Technology**, Drilling **Operations**, **Directional** Drilling**, Formation Damage** Evaluation & Preventive, **Formation Damage** Remediation, **Drilling & Formation Damage**, Simulation Program for The **International Petroleum Business**, **Well** Testing & Analysis, **Well** Design, **Well** Testing & Oil Well Performance, **Well** Test Design Analysis, **Well Test** Operations, **Well Testing & Perforation**, **Water Technology** in Oil & Gas Production, **Water Management** for Oil & Gas Operations, **Water Processing** for Oilfield Development, **Operational Water** Technologies, **Oilfield Water Chemistry**, **Water Sampling** Techniques, **Controlling Water Quality**, **Water** System Problems, Root Cause Analysis (**RCA**), RCA Method for Process Plant, **RCA** Techniques, Control Well-Flow Lines Parameters, Decision Analytic Modelling Methods for **Economic Evaluation**, **Probabilistic Risk Analysis** (**Monte Carlo Simulator**) **Risk Analysis** Foundations, Sulphur, Sour Natural Gas, **Natural Gas Sweeting**, **Petroleum Production**, Field Layout, **Production** Techniques & Control, **Surface Production** Operations, **Project Risk Analysis**, **Feasibility Analysis** Techniques, **Capital Operational Costs**, **Flowmetering & Custody Transfer** and **Oil Refinery**. Further, he is also well-versed in Enhanced Oil Recovery (**EOR**), Electrical Submersible Pumps (**ESP**), **Oil Industries Orientation**, **Geophysics**, **Cased Hole** Formation Evaluation, **Cased Hole** Applications, **Cased Hole** Logs, **Production Wells** Operations, **Production Facilities** Management, **Perforating** Methods & Design, **Perforating** Operations, **Fishing** Operations, **Well & Reservoir** Testing, **Reservoir** Stimulation, **Hydraulic Fracturing**, **Carbonate** Acidizing, **Sandstone** Acidizing, **Drilling Fluids** Technology, Drilling Operations, **Directional** Drilling, **Artificial Lift**, **Gas Lift Design**, **Gas Lift** Operations, Petroleum Business, **Petroleum Economics**, **Field Development** Planning, **Gas Lift Valve** Changing & Installation, **Well Completion** Design & Operation, **Well** Surveillance, **Well** Testing, **Well** Stimulation & Control and **Workover** Planning, Completions & Workover, **Rig Sizing**, **Hole Cleaning & Logging**, **Well Completion**, **Servicing & Work-Over** Operations, Practical **Reservoir Engineering**, **X-mas Tree & Wellhead** Operations, Maintenance & Testing, Advanced **Petrophysics/Interpretation** of **Well Composite**, **Construction Integrity** & **Completion**, **Coiled Tubing** Technology, **Corrosion Control**, **Slickline**, **Wireline & Coil Tubing**, **Pipeline Pigging**, **Corrosion** Monitoring, **Cathodic Protection** as well as Root Cause Analysis (**RCA**), Root Cause Failure Analysis (**RCFA**), **Gas Conditioning & Process Technology**, **Production Safety** and **Delusion of Asphalt**. Currently, he is the **Operations Consultant** & the **Technical Advisor** at **GEOTECH** and an independent **Drilling Operations Consultant** of various engineering services providers to the international clients as he offers his expertise in many areas of the **drilling & petroleum discipline** and is well **recognized & respected** for his process and procedural expertise as well as ongoing participation, interest and experience in continuing to promote technology to producers around the world.

Throughout his long career life, Dr. Christos has worked for many international companies and has spent several years **managing** technically **complex wellbore interventions** in both **drilling** & **servicing**. He is a **well-regarded** for his **process** and **procedural expertise**. Further, he was the **Operations Manager** at **ETP Crude Oil Pipeline Services** where he was fully responsible for optimum operations of crude oil pipeline, **workover** and **directional drilling**, **drilling rigs** and equipment, drilling of various geothermal deep wells and **exploration wells**. Dr. Chris was the **Drilling** & **Workover Manager** & **Superintendent** for **Kavala Oil** wherein he was responsible for supervision of **drilling** operations and **offshore exploration**, quality control of performance of **rigs**, **coiled tubing**, **crude oil** transportation via pipeline and abandonment of **well** as per the API requirements. He had occupied various key positions as the **Drilling Operations Consultant**, **Site Manager**, **Branch Manager**, **Senior Drilling** & **Workover Manager** & **Engineer**, **Drilling** & **Workover Engineer**, **Process Engineer**, **Operations Consultant** and **Technical Advisor** in several petroleum companies responsible mainly on an **offshore** sour oil field (under water flood and gas lift) and a gas field. Further, Dr. Chris has been a **Professor** of the **Oil Technology College**.

Dr. Christos has **PhD** in **Reservoir Engineering** and a **Master's** degree in **Drilling & Production Engineering** from the **Petrol-Gaze Din Ploiesti University**. Further, he is a **Certified Surfaced BOP Stack Supervisor** of **IWCF**, a **Certified Instructor/Trainer**, a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management** (**ILM**) and has conducted numerous short courses, seminars and workshops and has published several technical books on **Production Logging**, **Safety Drilling Rigs** and **Oil Reservoir**.

OR,

(2) 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 **Artificial Lift** Technology, **Fishing** Operations, **Drilling & Work-Over** Operations, Directional Drilling, **Drilling** Production & Operations, **Slickline** Units & Wire Selection, Safety in **Slickline Operations**, **Slickline Jarring** Techniques, **Slickline** in High-Pressure, High-Temperature Wells, **Slickline Well** Integrity, Pressure Control Equipment (**PCE**), **Horizontal Wells**, **Well Surveillance**, **Well** Testing, Design & Analysis, **Well** Testing **& Oil Well Performance**, **Well Log** Interpretation, **Well Workover** Supervision, **Coiled Tubing** Operations & Interventions, **Coiled Tubing** Technology, **Cement Evaluation & Corrosion Logging**, **Cementing** Performance & **Corrosion** Monitoring, **Cement** Integrity Testing, **Corrosion** Diagnostics, Corrosion Detection, **Cased Hole Logging**, 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 Hole Logging** Methods, Open & Cased Hole Logging, **Wireline Logging**, **Mud Logging**, **Production Logging**, **Slick Line**, **Fractured Reservoir** Classification & Evaluation, Screening of Oil Reservoirs for **Enhanced Oil Recovery**, **Improved Oil Recovery**, **Enhanced Oil Recovery** Techniques, **Oil Reservoir** Evaluation & Estimation, **Reserves & Resources**, **Reserves Estimation** & **Uncertainty**, **Reserve** Evaluation, **Play Assessment & Prospect Evaluation**, **OIP Estimation & Range** of **Uncertainty**, **Reservoir** Characterization, **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 & Heavy Oil, **Reservoir** Volumetrics, Water Drive **Reservoir**, **Unconventional Resource & Reserves** Evaluation, **Oil & Gas Reserves** Estimation, **Petrophysics & Rock** Properties**, Seismic** Technology, Geological and Geophysical (**G&G**) Data Interpretation, **Geological** Modelling, **Water Saturation**, **Crude Oil & Natural Gas** Demand, **Exploration Agreements & Financial** Modelling, **Seismic Survey** Evaluation, **Exploration Well** Identification, **Field Production** Operation, **Field Development** & Production of Oil & Gas, **Field Development** Evaluation, Crude Oil Marketing, **Core & Log Data** Integration, **Core Logging**, Advanced **Core & Log Integration**, **Well Logs & Core Analysis**, Special Core Analysis (**SCAL**), **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 Supply & Demand**, **Oil Contracts**, **Government Legislation & Oil Contractual Agreements**, **Oil Projects** & Their Feasibility (revenue and profitability), Rock & Fluid Properties, Fluid Flow Mechanics, Fluid Properties and Phase Behavior (**PVT**), PVT Analysis, Material Balance, Darcy's Law & Applications, Radial Flow, **Gas Well** Testing, Natural Water Influx, EOR Methods, **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. Konstantinos 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. Konstantinos 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.

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, 11th of October 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	**PRE-TEST**
0830 – 0900	**Integrated Production System Overview** Importance of an Integrated Approach in Field Development • Components of the Production System: Reservoir, Wellbore & Surface Facilities • Data Integration & Workflow Optimization • Case Studies Highlighting Integrated Modelling Benefits
0900 – 0930	**Basics of PROSPER** Software Philosophy & User Interface Navigation • Data Input Requirements & Model Setup • Understanding Output Results & Diagnostics • Integration Capabilities with Other IPM Tools
0930 – 0945	Break
0945 – 1130	**Wellbore Pressure Losses** Gravity & Frictional Pressure Losses • Multiphase Flow Considerations: Slip & Holdup • Impact on Production Performance • Mitigation Strategies
1130 - 1230	**PVT Analysis in PROSPER** Importance of Accurate PVT Data • PVT Correlations & Fluid Characterization • Sensitivity Analysis on Fluid Properties • Integration with Well Performance Models
1230 – 1245	Break
1245 – 1330	**Vertical Lift Performance (VLP) Correlations** Overview of Common VLP Correlations • Selection Criteria Based on Well Conditions • Calibration Using Field Data • Impact on Production Forecasting
1330 - 1420	**Workshop: Building a Wellbore Model** Data Gathering & Input into PROSPER • Model Calibration Using PVT & VLP Data • Running Sensitivity Analyses • Generating Lift Curves for Integration with GAP
1420 – 1430	**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
1430	Lunch & End of Day One

Day 2: Monday, 12th of October 2026

0730 – 0830	**Inflow Performance Models** Vogel's Equation for Solution Gas Drive Reservoirs • Darcy's Law for Single-Phase Flow • Multilayer & Horizontal Well Considerations • Fractured Reservoir Inflow Behaviour
0830 – 0930	**Skin Effect & Gravel Pack Design** Understanding Skin Factor & its Impact • Diagnosis of Formation Damage • Design Principles of Gravel Packs • Modelling Skin Effects in PROSPER
0930 - 0945	Break

0945 – 1130	***Gas Lift Systems*** *Principles of Gas Lift Operation • Design Methodologies Using PROSPER • Diagnostics & Optimization Techniques • "Quick Look" Analysis for Gas Lift Wells*
1130 – 1230	***Electric Submersible Pumps (ESP)*** *ESP Components & Operational Principles • Design & Selection Criteria • Performance Analysis & Troubleshooting • Integration with Well Models in PROSPER*
1230 – 1245	*Break*
1245 - 1330	***Workshop: Inflow & Artificial Lift Modelling*** *Building Inflow Performance Models • Incorporating Skin & Gravel Pack Effects • Designing Gas Lift & ESP Systems • Running Sensitivity Analyses for Optimization*
1330 – 1420	***Artificial Lift Optimization Strategies*** *Selection Criteria for Artificial Lift Methods • Economic Considerations in Lift Selection • Monitoring & Performance Evaluation • Case Studies on Artificial Lift Optimization*
1420 – 1430	***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*
1430	*Lunch & End of Day Two*

Day 3: **Tuesday, 13th of October 2026**

0730 – 0830	***Basics of MBAL*** *Material Balance Principles • Reservoir Drive Mechanisms • MBAL Software Capabilities & Interface • Data Requirements for Model Setup*
0830 – 0930	***Aquifer Modelling*** *Types of Aquifer Models • Estimating Aquifer Parameters • Impact on Reservoir Performance • Integration with Reservoir Models*
0930 - 0945	*Break*
0945 – 1130	***History Matching Techniques*** *Graphical versus Numerical Methods • Adjusting Model Parameters for Match • Validation Using Production Data • Common Challenges & Solutions*
1130 – 1230	***Prediction & Forecasting*** *Setting Up Prediction Scenarios • Incorporating VLP & IPR Data from PROSPER • Applying Operational Constraints • Analyzing Forecast Results*
1230 – 1245	*Break*
1245 - 1330	***Multi-Tank & Multi-PVT Systems*** *Modelling Complex Reservoir Systems • Handling Multiple PVT Regions • Integration Strategies in MBAL • Case Studies on Multi-Tank Modelling*
1330 – 1420	***Workshop: Reservoir Model Development*** *Building a Tank Model in MBAL • Performing History Matching • Integrating with PROSPER for Predictions • Field Development Planning Exercises*
1420 – 1430	***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*
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 14th of October 2026

0730 – 0830	***Basics of GAP*** *Overview of Surface Network Modelling • GAP Software Interface & Features • Data Input & Model Setup • Integration with PROSPER & MBAL*
0830 – 0930	***Building Surface Network Models*** *Creating Network Topology • Defining Nodes & Connections • Inputting Equipment & Pipeline Data • Model Calibration & Validation*
0930 - 0945	*Break*
0945 – 1130	***Surface Performance Curves*** *Generating & Interpreting Performance Curves • Analyzing System Bottlenecks • Optimizing Network Performance • Exporting Data for Further Analysis*
1130 – 1230	***Production Monitoring & Allocation*** *Incorporating Well Test Data • Allocating Production to Individual Wells • Handling Measurement Uncertainties • Reporting & Visualization Tools*
1230 – 1245	*Break*
1245 - 1330	***Constraints & Optimization*** *Applying Constraints at Various Network Levels • Optimizing Gas Lift Allocation • Scenario Analysis for Field Development • Economic Evaluation of Optimization Strategies*
1330 – 1420	***Workshop: Integrated Network Modelling*** *Linking PROSPER & MBAL Models to GAP • Running Full-Field Simulations • Analyzing Optimization Results • Developing Field Development Scenarios*
1420 – 1430	***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*
1430	*Lunch & End of Day Four*

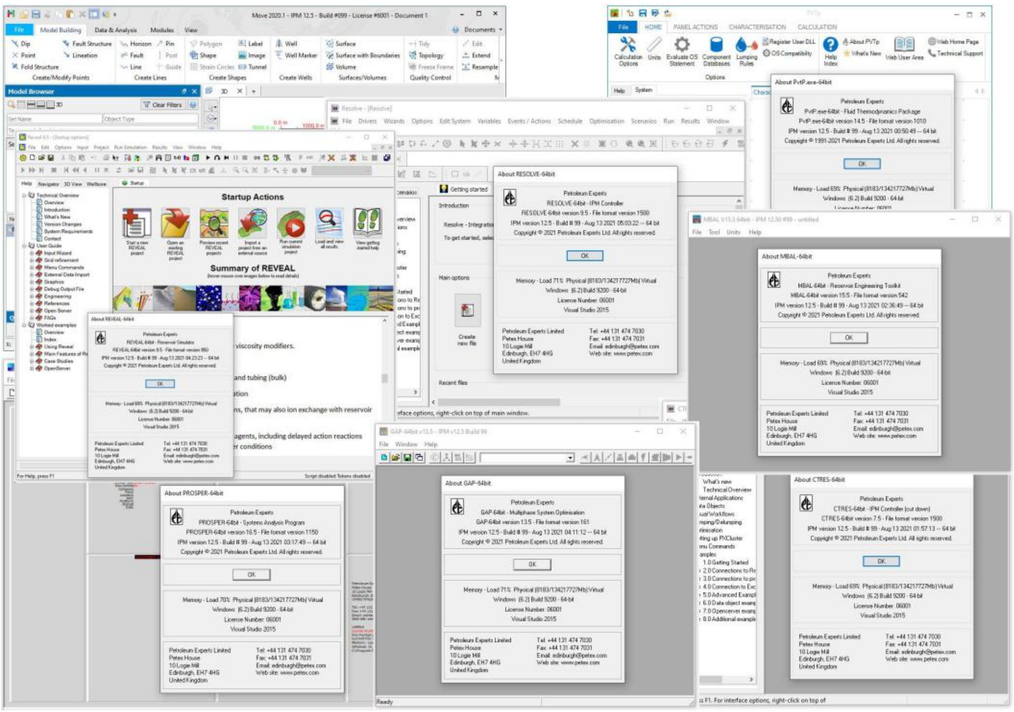
Day 5: Thursday, 15th of October 2026

0730 – 0830	***Integrated Modelling Concepts*** *Benefits of Integrated Modelling • Workflow Integration Across IPM Tools • Data Consistency & Management • Challenges & Best Practices*
0830 – 0930	***Field Development Planning*** *Setting Production Targets • Scheduling Well Development • Evaluating Artificial Lift Requirements • Assessing Infrastructure Needs*
0930 – 0945	*Break*
0945 – 1100	***Artificial Lift Impact Analysis*** *Comparing Lift Methods Across the Field • Evaluating Production Enhancements • Cost-Benefit Analysis of Lift Options • Integration with Reservoir & Surface Models*
1100 – 1130	***Optimization Strategies*** *Identifying Bottlenecks in the Production System • Implementing Constraint-Based Optimization • Scenario Analysis for Decision-Making • Utilizing Optimization Tools Within IPM Suite*
1130 - 1230	***Forecasting & Uncertainty Management*** *Generating Production Forecasts • Incorporating Uncertainties in Models • Sensitivity Analysis on Key Parameters • Risk Assessment & Mitigation Planning*

1230 – 1245	*Break*
1245 – 1345	***Workshop: Full Field Development Case Study*** *Building an Integrated Model Using PROSPER, MBAL & GAP • Designing a Well Development Schedule to Meet Production Targets • Analyzing the Effect of Artificial Lift on Field Performance • Optimizing the Field Development Plan Based on Model Insights*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) 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*

Simulator (Hands-on Practical Sessions)

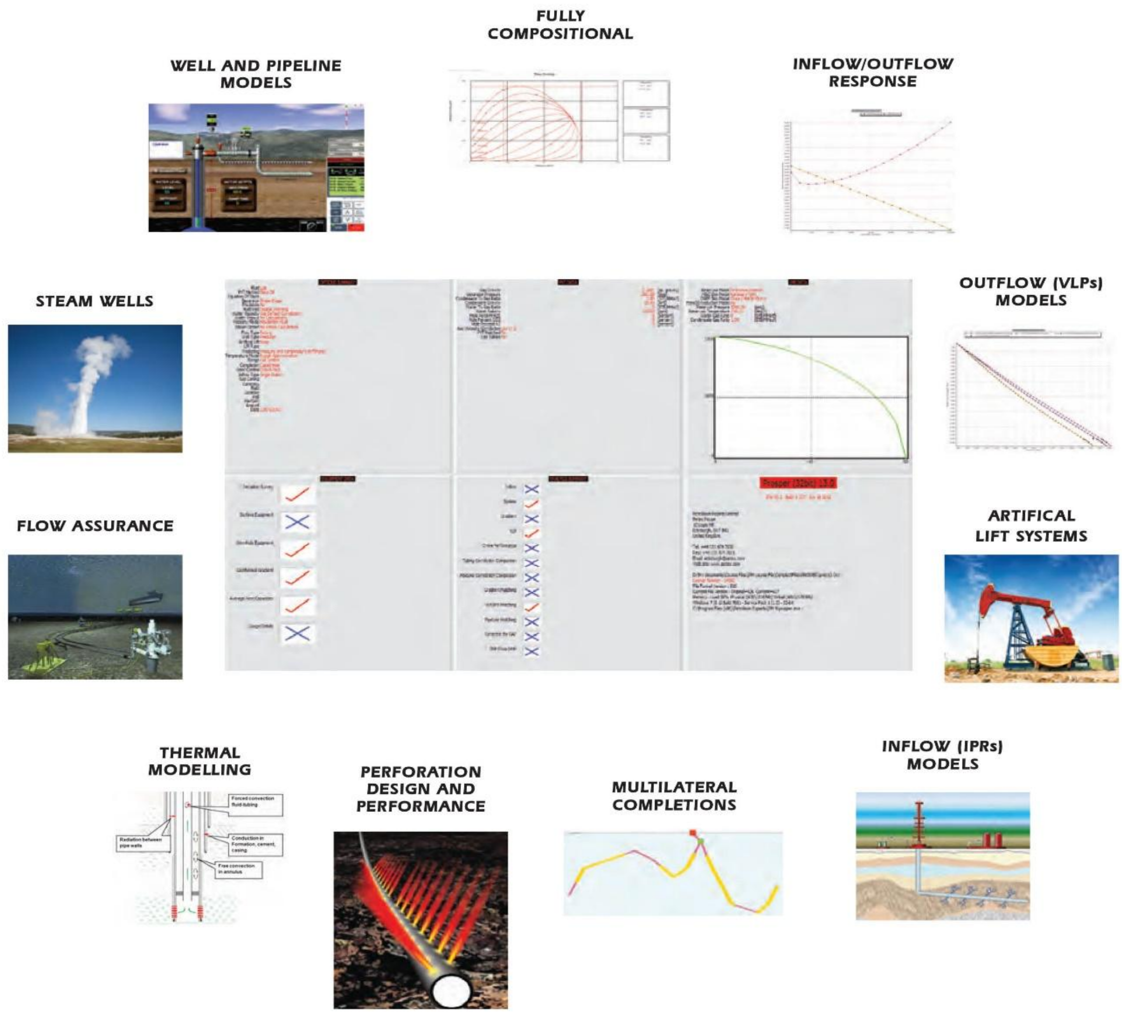
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "PETEX IPM Suite Software", "Prosper", "MBAL" and "GAP" software".



PETEX IPM Suite Software

PROSPER

MULTIPHASE WELL AND PIPELINE NODAL ANALYSIS



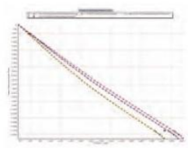
PROSPER

MULTIPHASE WELL AND PIPELINE NODAL ANALYSIS

WELL AND PIPELINE MODELS

PROSPER was commercialised in the early 90's and has been the subject of ongoing research and development for over two decades. Each year, new models and functionalities are added to the already extensive list of options in the program. There are over three million combinations of options that can be used to describe the vast majority of physical phenomena happening in wells and pipelines. In spite of the large number of situations that can be modelled, the adaptive interface only presents the user with the relevant input fields and menus according to the selections made in the options menu, keeping the model building effort at a minimum. PROSPER has evolved into the industry standard for well and pipeline modelling due to it's unrivalled sound technical basis and unique modelling capabilities. The program today forms one of the foundation stones of the Digital Oil Field system, and the calculation engine is utilised by numerous workflows in real time on hundreds of fields world-wide.

OUTFLOW (VLPs) MODEL

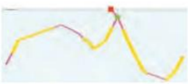


As part of the package of unique features available in PROSPER, research being conducted since Petex was founded has resulted in the creation of a number of proprietary multiphase flow pressure drop models (both empirical and mechanistic). The objective of this research has been to create fundamentally rigorous models that overcome the limitations of traditional models available in the industry. Petex is uniquely placed to have access to data from all over the world and over the years, a comprehensive database of pressure drop measurements has been created, which allows our researchers to compare novel physical models to real world information. Independent comparisons done by industry experts in multiphase flow have proven the reliability and consistency of the Petroleum Experts pressure drop models, to the point where these models are being widely used to quality check measurements obtained in the field. As part of a clearly defined well test quality check workflow, users have the ability to compare and contrast the behaviour of traditional pressure drop models with the ones uniquely available in PROSPER in order to assess suitability and consistency over the life of a well. Should users choose to use third party pressure drop models such as OLGAS or LEDAFLOW, these are also available as plug-ins, provided that the relevant licenses from the third party vendors are put in place.

INFLOW (IPRs) MODEL

A comprehensive set of inflow models complement the multiphase flow capabilities in PROSPER, enabling Nodal Analysis calculations to be done for virtually any type of well. There are over 20 inflow models that have been developed over the years, that can be applied to horizontal, vertical, deviated, multilayer and multilateral geometries. Furthermore, novel development has seen the realisation of unique inflow models that account for changing PVT conditions in the well drainage area as well as in multiple zones. This allows re-perforation studies, analysis of skin, the application of sand control measures and many other sensitivities to be conducted easily.

MULTILATERAL COMPLETIONS

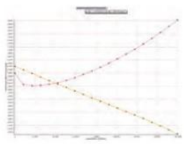


Alongside all of the analytically derived Inflow Performance Relationships available in PROSPER, the Multi-Lateral IPR model is the culmination of extensive research and has been designed specifically for complex well completions that have undulating trajectories across multiple producing zones. This is the most advanced analytical IPR that exists in the industry today and can only be found in PROSPER as another one of the many unique features in the program.

PROSPER

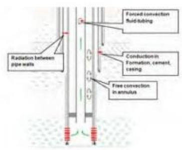
MULTIPHASE WELL AND PIPELINE NODAL ANALYSIS

INFLOW/OUTFLOW RESPONSE



The rigorous multiphase pressure drop models and unique list of inflow performance relationships come together to form system calculations for well and pipeline models. This allows for assessing the productivity of oil, gas and condensate wells to be performed, both for production and injection scenarios, with or without artificial lift. Sensitivities can be conducted through a simple interface that allows the investigation of virtually all parameters that are inputs to the models and the matching workflows allow for comparisons to be done between the results predicted by the models and the measurements obtained for these wells if they are already operational.

THERMAL MODELLING

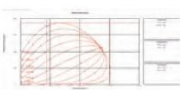


PROSPER is capable of modelling thermal profiles in wellbores using multiple methods, ranging from a constant rate of heat transfer (Rough Approximation) through to a detailed and rigorous full energy balance (Enthalpy Balance) that considers the forced and free convection, conduction and radiation heat transfer mechanisms. The latter considers a detailed materials specification, and to aid with this PROSPER has been furnished with a database of common casing, tubing, cement and mud descriptions with their associated heat transfer properties. Users can also take advantage of a hybrid thermal calculation technique that was developed by Petex (Improved Approximation). This allows for Joules-Thomson effects to be captured in the well, while at the same time enabling multiple heat transfer coefficients with depth to be used.

FLOW ASSURANCE

Flow assurance studies are an integral part of any pipeline and well analysis, done both for designing and troubleshooting purposes. In PROSPER many years of research have been dedicated to addressing these issues and users can study either hydraulic flow assurance challenges, or issues related to the thermodynamic behaviour of fluids. Hydraulic investigations can be conducted on flow regimes, erosional velocities, superficial velocities, wellbore stability analysis (liquid loading), slug catcher sizing and many others. Thermodynamic calculations can include studies on hydrate formation, waxing, salt precipitation and others. PROSPER will indicate where in the system these issues might occur and the user has options to consider intervention (e.g. hydrate inhibition, surfactants, etc.) or changing the operational conditions (wellhead pressure).

FULLY COMPOSITIONAL



As is the case with all the programs developed by Petex, PROSPER uses a powerful thermodynamics engine to complement the traditional black oil models that provide all the thermodynamic properties needed for the pressure drop, flow assurance and inflow calculations. In fully compositional mode, PROSPER allows users to take advantage of advanced hydrate prediction and mitigation calculations, salt deposition, special handling of CO_2 for dense and light phases and many other functionalities. In black oil mode, a large number of correlations are available that can be compared and matched to lab data. Special correlations for heavy oils have been implemented and these, coupled with an emulsion model as well as special heavy oil pressure drop models, make PROSPER unique in being able to deal with such fluids and the intricacies of producing them. Another feature that is widely used is the ability to predict the vaporised water that is produced from gas wells. This is based on industry standard calculations that have been modified based on data received from clients to create a uniquely accurate model for analysing this situation.

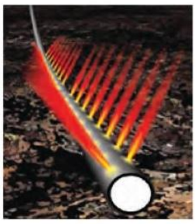
PROSPER

MULTIPHASE WELL AND PIPELINE NODAL ANALYSIS

ARTIFICAL LIFT SYSTEMS

Artificial lift design and troubleshooting has been an area where PROSPER has offered unparalleled modelling capabilities to the user community for many years. Gas Lift, ESPs, HSPs, Coil Tubing Gas Lift, PCPs, Jet Pumps, Sucker Rod Pumps are only a few of the many lift mechanisms that can be evaluated for new and existing installations. With every new release of the program, one or more methods are added and the capability of the existing methods are enhanced. A database of equipment (Pumps, valves, motors etc) is available and is being updated every year as new descriptions become available. Unique features include the Quicklook troubleshooting workflows, minimum energy methodologies for HSP wells, designs that consider the inflow performance and many others. The latest addition to the list is a Fully Transient Gas Lift Simulator, which simulates the unloading phase of gas lifting and allows users to assess the stability of such wells. All the artificial methods available can be made part of a bigger network model (GAP) for full field optimisation as well as the Digital Oilfield systems where they can form the basis of any workflow that users wish to automate (for surveillance, diagnostics and others).

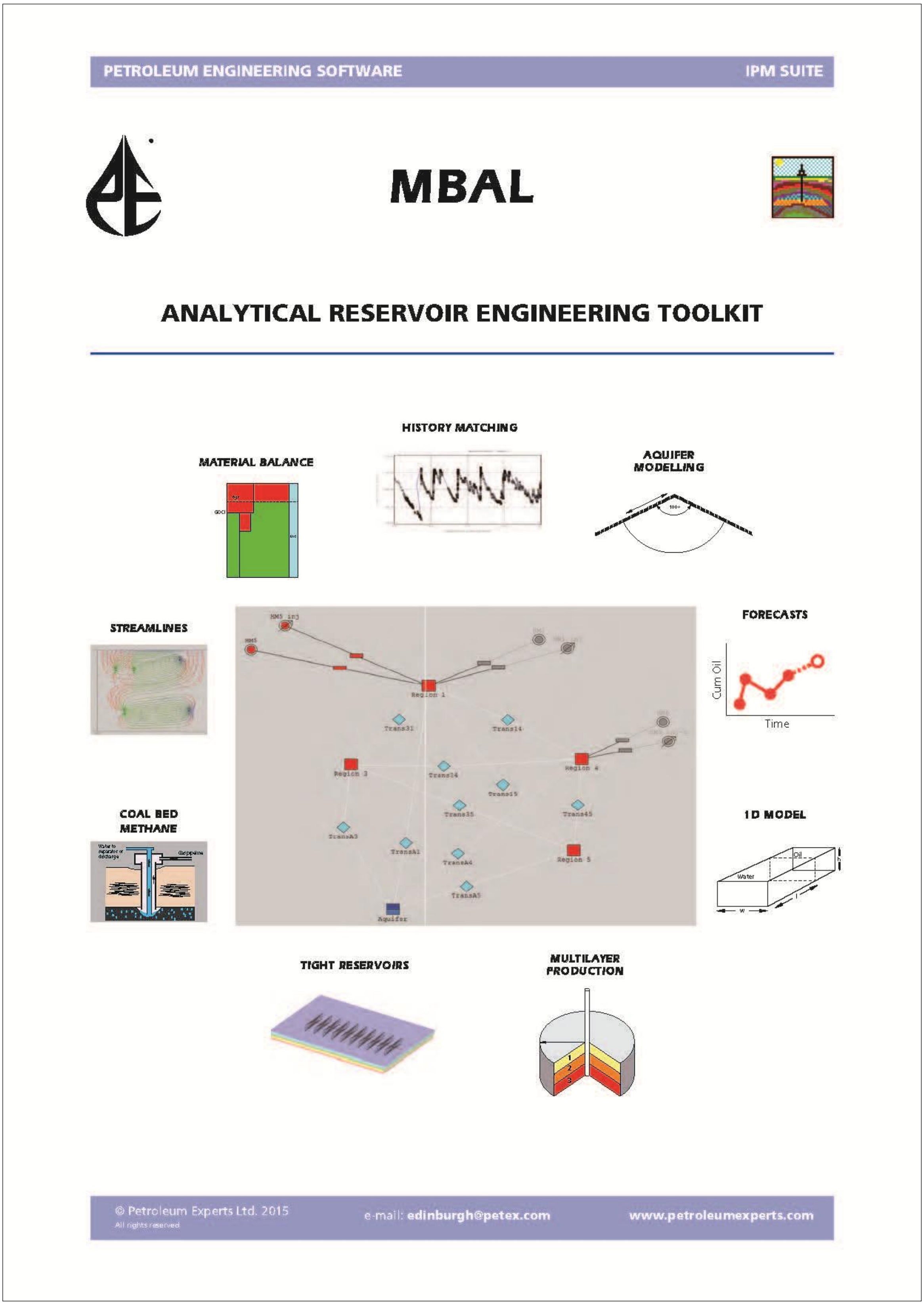
PERFORATION DESIGN AND PERFORMANCE



As part of the philosophy of sharing knowledge among operators in the industry, Shell has contributed their proprietary perforation optimisation tool (SPOT) which can now be found as part of the standard toolkit of calculations in PROSPER. The objective of this module is to allow engineers to compare the perforation charge performance and assist in selecting the optimum perforation gun. This can be done through the charge properties, rock properties (averages of obtained from logs), fluid properties and by using appropriate drilling mud invasion models. It can handle open hole completions as well as cased hole completions. The implementation in PROSPER allows the output of SPOT to be directly combined with the vertical lift performance models to predict the complete well performance, therefore eliminating the artificial boundary conditions that would need to be put in place if only the inflow part of the well was considered.

STEAM WELLS

Steam injection wells (SAGD, Huff and Puff, Direct Steam Injection) are becoming more common in the industry and modelling of such systems can be done through a variety of tools in the IPM Suite, primarily REVEAL. PROSPER is also steam enabled and if the wells to be modelled relate to steam injection systems, then lift curves can be generated that can be used to model steam distribution systems (in GAP). In creating integrated steam injection systems models, the efficient designs of the network, analysing the operating envelope limits, evaluating energy management and the economics are now feasible for what have traditionally been a costly operation.


PETROLEUM ENGINEERING SOFTWARE IPM SUITE

MBAL

ANALYTICAL RESERVOIR ENGINEERING TOOLKIT

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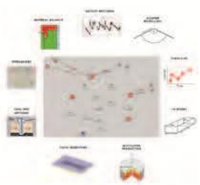
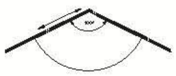
MBAL TECHNICAL CAPABILITIES



MBAL

ANALYTICAL RESERVOIR ENGINEERING TOOLKIT

AQUIFER MODELLING

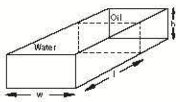


For existing reservoirs where the PVT and historical production is known, MBAL provides extensive matching facilities and the ability to model the **size** and **strength** of **drive mechanisms**. Both **steady state** and **transient responses** can be modelled in MBAL, using the industry standard and Petroleum Experts Modified models. The sizing of the aquifer (based upon its pressure support response) provides a way of calibrating known physics against production data, which once calibrated can be used to forecast.

FORECASTS

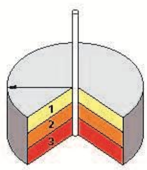
MBAL can be used to carry out forecasting/predictions in two ways, (i) as a reservoir tool in an integrated model or (ii) as a standalone reservoir analysis tool kit. In both cases MBAL can perform **fast calculations** honouring the history matched **aquifer** and **relative permeability's** as the basis for predictions. Using the history matched model **relative permeability curves** are generated. These curves -which are physically representative - describe how one phase flows relative to the others in the well drainage area. Implicit to these curves is **well positioning** in the reservoir, and allows **two wells in a single homogenous tank** to exhibit different production profiles (e.g. if one well is closer to the **Oil-Water Contact** its production history will give different Relative Permeability curves). The creation of bespoke relative permeability curves for each well based upon historical production, is **novel** and a departure from classical theory. Combined with **GAP**, full field development planning is possible. When run standalone, MBAL can be used to analyse the saturations and pressure decline over time. Using a **multi-tank** system with **transmissibilities** can be used to model **partially sealing faults** and **pressure activated faults** where production from one compartment (**compartmentalised reservoirs**) initiates flow from one part of the reservoir to another as production occurs in the forecast.

1D MODEL



The **1D Model** allows the study of the displacement of oil by water using fractional flow and Buckley Leverett equations for a single layer. In the Multi layer context, the **Multi-Layer tool** allows the creation of a set of Relative Permeability curves for each layer using the immiscible placement theories of **Buckley Leverett, Stiles, Communicating Layers** (using theory from **L.P Dake**) and simple (single cell simulation). Having generated the profiles, these can then be seamlessly brought to the material balance tool for further matching and analysis.

Multilayer Production



Often wells can be completed in multiple layers, and production from several producing intervals can be achieved in the field. In this context it is customary to measure the production rates at the surface rather than on a layer by layer basis, and the classical method of allocating production was on the basis of permeability and pay height. The **Reservoir Allocation tool** is a novel modification to this allocation method, and uses IPRs to perform this back allocation. Once allocated the rates can then be brought from the **Reservoir allocation tool**, to the **Material Balance** tool, and a history match performed as usual. This can be performed iteratively until a history match is achieved. Alongside the multi layer systems, **multi-tank** systems, **gas recycling, inter-tank transmissibility's** can all be captured in MBAL.

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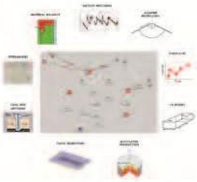


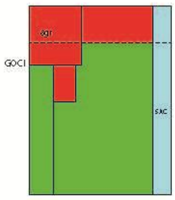
MBAL

ANALYTICAL RESERVOIR ENGINEERING TOOLKIT

MBAL

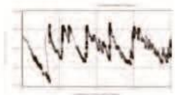
MBAL- commercialised in the early 1990s- is a reservoir engineering tool kit that is intended to assist reservoir engineers in their analytical studies of the reservoir. This includes, but is not limited to, material balance calculations. Aside from **Material Balance**, other tools also available are **Decline Curve Analysis, 1D model, Monte Carlo Simulations, Coal Bed Methane, Reservoir Allocation, Tight Reservoir Modelling** and **Streamlines**. All available techniques can be used in isolation or in combination to achieve engineering objectives. As the name of the program suggests, Material Balance calculations are a core functionality and includes many advancements on the classical Material Balance concept found in literature. Aside from allowing engineers to estimate the oil or gas originally in place and understanding **drive mechanisms**, many novel approaches such as performing predictions using relative permeability curves and multi-tank modelling ensure that MBAL can provide a solid platform on which reservoir physics and production plans can be studied in detail.

MATERIAL BALANCE



MBAL allows non dimensional reservoir analysis to be conducted throughout the life of the field, whether this is in early field life when limited data is available, or even in mature fields where more certainty exists. As such, this straightforward but powerful reservoir toolkit can be applied throughout the life of the reservoir, and is often used in conjunction with numerical simulators as a quality check of history matching, and/or as a proxy model for fast calculations. Using limited data (PVT and cumulative production) the engineer is well equipped to find the amount of oil in place, and any associated drive mechanisms. Unlike the classical theory, MBAL can be used to describe any hydrocarbon fluid (Oil, Gas or condensate) using either Black oil or compositional descriptions in scenarios where variations in PVT with depth occur (Compositional gradient are important in high relief reservoirs). Moreover, compartmentalised reservoirs with partially sealing faults, or pressure activated faults can be modelled and history matched by creating multi-tank models with transmissibilities. This evolution of the material balance concept is another innovation from Petroleum Experts, and extends the range of applicability to full field life.

HISTORY MATCHING



MBAL's progressive menu options lead the engineer logically through the history matching process, which is performed graphically using industry standard techniques (e.g. **Cole, Campbell, P/Z plots**) and allows the identification of drive mechanisms in place, and whether the measured data entered is to be trusted. Having used the analytical methods available in MBAL to history match the analytical model, a simulation is run of the history, and yields two valuable results: Firstly, by running the historical period in a simulation, the user can compare the production profiles predicted from the model and the data entered (a close match indicating a good history match). Secondly, by running the history as a prediction, MBAL will calculate all the historical production profiles, saturations and reservoir pressures in the historical period. This can be used to create custom relative permeability curves and **calibrate** these to the History matched model. The historical data can be entered on a tank basis, or in a well by well basis, in the latter context the Relative Permeability curves can be generated for the draining area of each well using the approach described above. It is this innovative capability that allows the analytical model to approach the response of reality and is a departure from classical literature based models.

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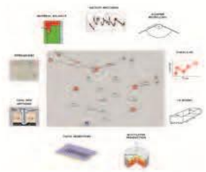


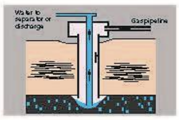
MBAL

ANALYTICAL RESERVOIR ENGINEERING TOOLKIT

TIGHT RESERVOIRS

Steady state IPRs assume that the reservoir boundary "feels" the production in a negligible amount of time. In **tight reservoir** plays this assumption breaks down as these conditions are reached in the time span of decades rather than days: as such it has been conventional to use **type curves** (from Pressure transient analysis) to try and predict the gas in place. MBAL has **Blasinghame** and **Agarwal-Gardener** type curves that allows the engineers to find GIIP, however these types curves have a geometry implicit within their formulation. These type curves have been implemented in MBAL for some time now, allowing MBAL to generate unconventional IPR responses, that can later be used for predictions and forecasting. These have been essentially superseded by the novel P_DT_D approach in RESOLVE, but are still used as a cursory quality check of production data prior to performing the analysis in RESOLVE.

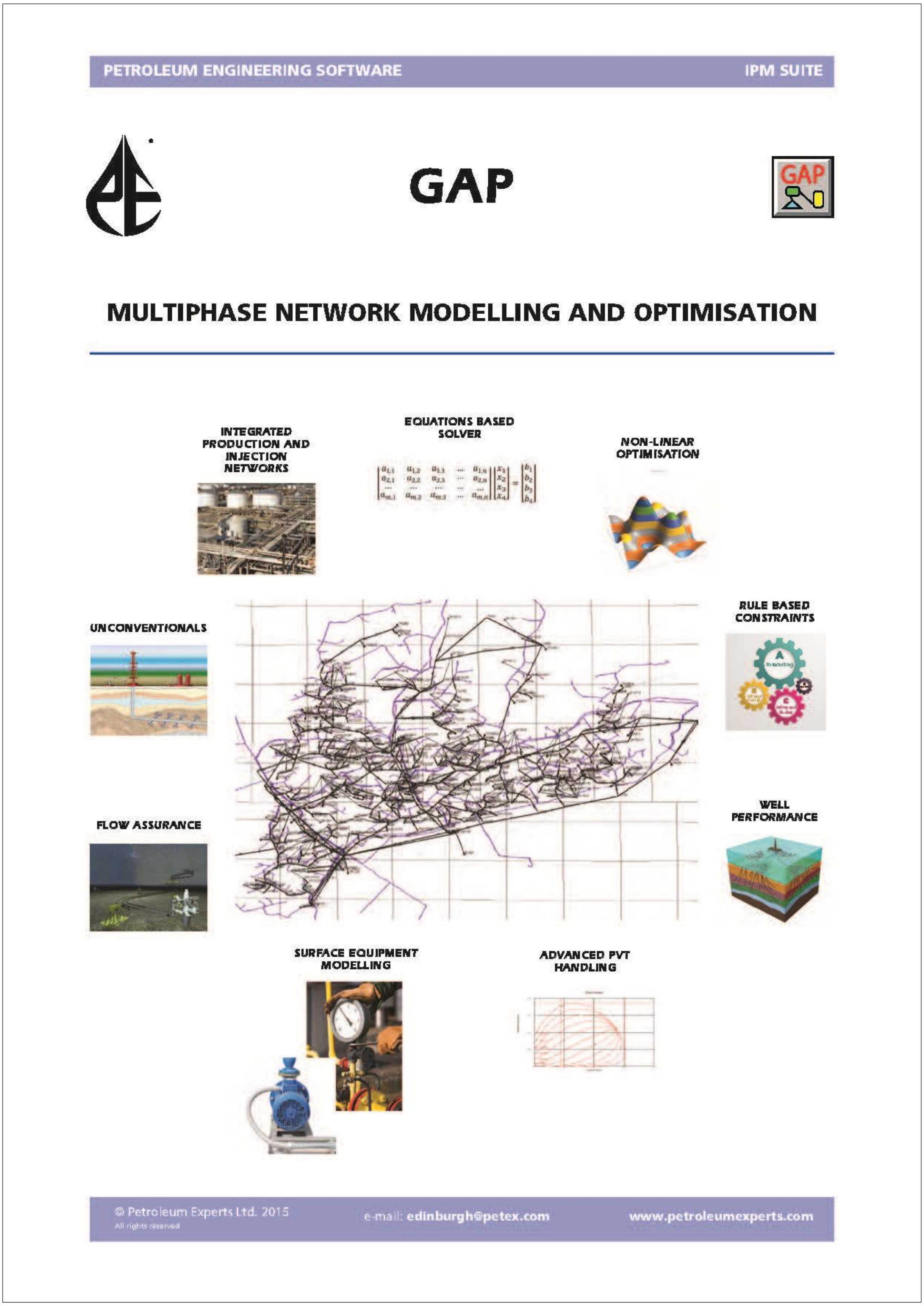
COAL BED METHANE



There are no real limitations (besides the fundamental material balance assumptions) on which fluid or reservoir types that can be modelled: **Oil, gas, tight gas, condensate, Coal Bed Methane** (using the **Langmuir isotherm**), **multi tank systems** can all be modelled. In the **Coal Bed Methane** context MBAL can be used to model the release of methane gas from the coal bed using either the **Langmuir** or modified **Langmuir isotherms**. Using these isotherms, predictions of the **dewatering** phase and **production** phases can be captured and integrated with the well and surface network response.

STREAMLINES

One of the investigations reservoir engineers typically perform relates to the determination of breakthrough time and evolution of watercuts (especially important in water flooded reservoirs). Material balance can be used to perform these forecasts, but necessitate production history data, which is not always available: this is where the **streamlines** functionality comes in. The streamlines module in MBAL allows a quick 2-dimensional simulation to estimate (I)**Sweep efficiencies** and (II) producing well **fractional flows** for a set well pattern of producers and injectors. This is not intended to replace the reservoir, rather allow a quick analysis of different well patterns and the overall effect on recovery. This 2D streamline tool allows the engineer to understand how the flood path of an injection well supports the producing well, determining **water breakthrough time** and **evolution of watercuts** (especially important in water flooded reservoirs). The streamlines tool is to be used when the Material balance and numerical simulation approaches are not adequate (i.e. MBAL will need history, and numerical simulations are computationally expensive when considering multiple producer injector patterns) and a fast way of finding breakthrough and watercut profiles is required.



PETROLEUM ENGINEERING SOFTWARE
IPM SUITE
GAP
MULTIPHASE NETWORK MODELLING AND OPTIMISATION
INTEGRATED PRODUCTION AND INJECTION NETWORKS
EQUATIONS BASED SOLVER
NON-LINEAR OPTIMISATION
UNCONVENTIONALS
RULE BASED CONSTRAINTS
FLOW ASSURANCE
WELL PERFORMANCE
SURFACE EQUIPMENT MODELLING
ADVANCED PVT HANDLING
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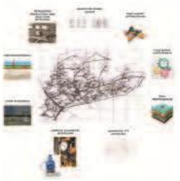

GAP

MULTIPHASE NETWORK MODELLING AND OPTIMISATION

INTEGRATED PRODUCTION AND INJECTION NETWORKS

Petex was created in 1990 with the objective of providing best in class software that would allow various disciplines to perform studies in understanding the behaviour of fields as well as design systems and optimise production. GAP was designed to eliminate artificial boundary conditions in reservoir, well and surface network models, through the creation of integrated models using Petex tools. It is able to consider the multiphase network response of multiple wells (with different PVT) producing into a common production system, where the response of one well would affect production of another (i.e. back pressure response). Today GAP is the **most sophisticated steady state multiphase network optimiser** that exists in the industry, with many **proprietary features** that allow engineers to maximise production from oil and gas fields all over the world. GAP has been the tool of choice for over 420 oil companies in over 80 countries and the corporate standard for all of the super majors in the area of integrated modelling. Year on year new features are added and improvements are made based on the development strategy of Petex and the requests from clients presented at the user meeting.

EQUATIONS BASED SOLVER

$$\begin{vmatrix} a_{1,1} & a_{1,2} & a_{1,3} \\ a_{2,1} & a_{2,2} & a_{2,3} \\ \cdots & \cdots & \cdots \\ a_{m,1} & a_{m,2} & a_{m,3} \end{vmatrix}$$

The objective of GAP is to capture the full field response of a hydrocarbon field using physical descriptions of each item that will affect production. The fundamental calculations done in GAP relate to balancing pressure, flow and temperature from all items in a system based on a single boundary condition at the end point (for production networks) or starting point (for injection networks). The solver being used is an **equation-based proprietary engine** that has been specifically designed and built for solving integrated oilfield networks. Starting points are internally evaluated and decades of research have allowed this to be the **fastest network solver** in the industry today (independently verified in tests by various oil companies). The solver takes into account all the physics that are present in the system and works by drawing information from all parts of the system, by performing dynamic calculations on the physical models (for pipelines, chokes, wells, compressors etc), or by using pre-calculated responses (for example lift curves).

NON-LINEAR OPTIMISATION

Once physical models are in place as an integrated system, optimisation algorithms can be used with the objective of increasing hydrocarbon recovery. For the past 20 years, one of the biggest areas of research in Petex has been on a mathematically rigorous **global non-linear optimisation algorithm that is proprietary and unique in the industry**. The user does not have to provide starting points and intelligence built into the system allows for selecting the appropriate technique depending on the problem at hand. Local optimisation techniques like BFGS, Fletcher Reeves, Rank1 and various others are nested within the structure of the optimiser and are coupled with a proprietary global optimum search engine that searches the whole production and injection space for the best possible solution. The control settings that will satisfy constraints as well as maximise production are then presented to the user in the form of choke settings, artificial lift quantities, compressor speed and any other control that may exist in the field and has been allowed to be considered in the optimisation problem.

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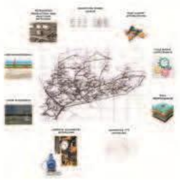
GAP TECHNICAL CAPABILITIES



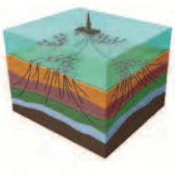
GAP

MULTIPHASE NETWORK MODELLING AND OPTIMISATION

RULE BASED CONSTRAINTS

GAP is often used for **long term planning activities** and for testing various **strategies** through long term forecasting. The objective in this context is not to optimise production on a day to day basis, but rather to honour constraints and evaluate long term production goals. This is achieved by using the **Rule Based Network Solver** functionality. The model is setup in the same way as it is to achieve optimisation objectives, the difference being in the fact that the constraints are met through a set of well defined rules that are adjusted by the user depending on the problem at hand. As this algorithm is extremely fast, forecasts can be obtained quickly and can include artificial lift individual well production maximisation (equal slope techniques for gas lifted wells for example).

WELL PERFORMANCE

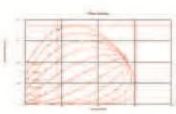


The performance of wells is typically handled by embedding PROSPER models in the integrated system, although dynamic well models can be captured through native GAP calculations. Wells can therefore be **evaluated and optimised** over time with respect to the back pressure response of the entire network. Design and performance can be assessed through the life span of each well, considering artificial lift (pumps, gas lift, etc.) or any other type of intervention. **Flow assurance** analysis features very strongly in well modelling, with dynamic calculations as well extended lift curves being used to assess the safe flowing envelopes that pressures, temperatures and rates will allow. Diagnostics of any proposed/existing design and how it handles future production conditions are at the centre of evaluation workflows in the tool.

FLOW ASSURANCE

Flow assurance studies centre around the **detection** of specific phenomena that are a function of the **fluid PVT** or the **pipeline hydraulics** (e.g. **Slugging, Liquid loading, Wax** formation, **Hydrate** formation, etc.). GAP harnesses all the existing functionality from PVTp and PROSPER to detect these phenomena across the entire surface network, and provide information that will address flow assurance challenges over time. Moreover, workflows can be setup in RESOLVE so that all the native functionality in GAP can be used as part of a bigger solution formulation scheme, going as far as performing calculations in real time for any objective the client wishes to embed in support of their field management activities.

ADVANCED PVT HANDLING



GAP has been designed to be able to handle different PVT descriptions that are used in the reservoir, wells and surface network. For instance, a fully compositional reservoir simulator will typically contain no more than 6-8 components, and everything downstream of this will usually contain more. GAP can use the **lumped** composition, and perform the **delumping** to a larger component composition. The Black Oil to Compositional feature in GAP was created to enhance the performance of these integrated models. This was achieved by using the EOS to generate the inputs of Black oil model, and using both descriptions in tandem. The consequence is a fluid description that harnesses all the advantages of EOS and black oil descriptions, without any of the weaknesses.

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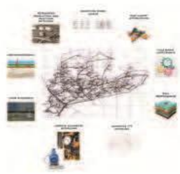
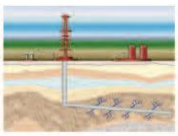


GAP

MULTIPHASE NETWORK MODELLING AND OPTIMISATION

UNCONVENTIONALS



GAP is often used for **long term recovery estimates** and testing the intended field. In recent years the production of unconventional reservoirs has become more viable and as such the need to capture the inflows, system response and PVT of **coal bed methane** (CBM), **tight, shale** and **heavy oil** reservoirs has increased. GAP has extended its functionality into this domain, allow the dewatering cycles and production cycles of CBM to be captured. The tight reservoir and shale inflow response is captured in REVEAL, but the multiphase flow in the well, and surface network is analysed in GAP.

SURFACE EQUIPMENT MODELLING

As exploration focuses on more remote inaccessible locations, long trunklines to transport fluids back to processing facilities are common place as are the use of various **turbo-machinery** to supplement the production efforts. In GAP **compressors** (single and **tandem screw compressors, reciprocating** and **multiphase**) and pumps (**performance curves, jet pumps** and **bespoke multiphase**) can all be modelled. Their response in time as production conditions change can also be assessed, thus making GAP an invaluable design tool in this context.

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